Project: **Bear Creek High School Agricultural Science Building**
Increment 1

Owner: Lodi Unified School District
1305 E. Vine Street
Lodi, CA 95240

Architect: SVA Architects, Inc.
7901 Stonebridge Dr., Pleasanton, CA 94588 **ADDENDUM 1**

Revision: **01/17/2024**

Note: The following revisions and clarifications to the Contract Documents (plans and specifications) shall become a part of the Contract Documents. All bidders are required to incorporate all necessary changes, additions, or deductions into their proposals.

1. GENERAL

A. Add the attached "Geotechnical Engineering Report: Bear Creek High School Agricultural Science Building" to the project documents. Bidder shall incorporate all recommendations and requirements applicable to their work.

2. PROJECT MANUAL

a. Section 27 10 00 Telecommunications
   i. Add the attached specification section 27 10 00.

b. Section 28 31 11 Fire Alarm/Voice Evacuation System
   i. Add the attached specification system 28 31 11.

3. DRAWINGS

a. Sheet E0.1a Electrical Symbols List
   i. Add the attached Increment 2 sheet E0.1.

b. Sheet E2.0 Electrical and Signal Plan
   i. Add the attached Increment 2 sheet E2.0.

c. Sheet E4.1 Technology Details
   i. Add the attached Increment 2 sheet E4.1.

d. Sheet EFA0.1 Fire Alarm System Information
   i. Add the attached Increment 2 sheet EFA0.1.

e. Sheet EFA0.2 Fire Alarm Details
   i. Add the attached Increment 2 sheet EFA0.2.

f. Sheet EFA0.3 Fire Alarm Riser Diagram and System Calculations

i. Add the attached Increment 2 sheet EFA0.3.

g. Sheet EFA1.0 Fire Alarm Plan
   i. Add the attached Increment 2 sheet EFA1.0.

h. Sheet LS-101
   i. Add the attached Increment 2 sheet LS-101.

4. PRE-BID QUESTIONS AND RESPONSES

1. Q: Fire alarm and low voltage scope was discussed at the pre-bid job walk, but fire alarm and low voltage drawings were not in the bid set. Please clarify/provide.

   A: Refer to the attached Increment 2 fire alarm and electrical/technology drawings and specifications for fire alarm and low voltage scope.

2. Q: Please confirm that all fire alarm and low voltage scope is to be included as a part of this bid.

   A: Pathways within the building will be provided by the district's building contractor. All other fire alarm and low voltage scope is to be included in this bid.

3. Q: What are the requirements for the building pad?

   A: Refer to the attached geotechnical engineering report and Increment 2 reference drawings for the building pad requirements that are to be a part of this bid.

4. Q: Please clarify the landscaping and irrigation requirements.

   A: Refer to the attached sheet LS-101 for the landscape and irrigation requirements and scope.

5. Q: Some of the building manufacturers have a scope matrix that shows what is in their scope and what is in the site contractor's scope. If one is available, can you share it?

   A: Refer to the attached responsibility matrix from JLM modular. Bidder is to incorporate all scope listed in the "site contractor" column in this bid.

Reason: Revision & Clarification of Bid Documents

Distribution:
Bidders
Owner
Inspector

Attachments:
Geotechnical Engineering Report: Bear Creek High School Agricultural Science Building
27 10 00 Telecommunications
28 31 11 Fire Alarm/Voice Evacuation System
Sheet E0.1a
Sheet E2.0
Sheet E4.1
Sheet EFA0.1
Sheet EFA0.2
Sheet EFA0.3
Sheet EFA0.4
JLM Responsibility Matrix
Increment 2 Reference Drawings

CB:cb
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Geotechnical Engineering Report
BEAR CREEK HIGH SCHOOL AGRICULTURAL SCIENCE BUILDING
Stockton, California

Prepared for:
Lodi Unified School District
1305 East Vine Street
Lodi, California 95240

Prepared by:
Universal Engineering Sciences
3410 West Hammer Lane, Suite F
Stockton, California 95219

Date: June 15, 2023
UES Project No. 4730.2300012.0016

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APPENDIX A – General Project Information, Field and Laboratory Test Results

1.0 INTRODUCTION

We have completed a geotechnical engineering study for the proposed agricultural science building to be constructed at the existing Bear Creek High School campus at 10555 Thornton Road in Stockton, California. The purposes of our work have been to explore the existing site, soil and groundwater conditions, and to provide geotechnical engineering conclusions and recommendations for the design and construction of the proposed construction and associated improvements.

1.1 Scope of Services

Our scope of services included the following tasks:

1. a site reconnaissance;
2. review of United States Geological Survey (USGS) topographic map, historical aerial photographs, and available groundwater information relevant to the site;
3. subsurface exploration, including the drilling and sampling of four soil borings to depths ranging from 6½ to 16½-feet below existing site grades;
4. laboratory testing of selected soil samples;
5. engineering analyses; and,
6. preparation of this report.

1.2 Project Description

We understand the project will consist of the design and construction of a new agricultural science building. The new building will cover a total building area of approximately 3,700 square feet. Associated development will consist of asphalt concrete pavements, concrete sidewalks, and underground utilities.

1.3 Figures and Attachments

This report contains a Vicinity Map as Figure 1, a Site Plan showing the approximate boring locations as Figure 2, and the Logs of Soil Boring as Figures 3 through 6. An explanation of the symbols and classification system used on the logs is contained in Figure 7. Appendix A contains information of a general nature regarding project concepts, exploratory methods used during the field exploration phase of our investigation, and laboratory test results.

2.0 FINDINGS

2.1 Site Description

The property encompasses a portion of the western end of Bear Creek High School in Stockton, California (Figure 1). The site is bounded to the north, east, and south by facilities of the school campus and to the west by a grass-covered play field.

At the time of our field explorations on May 10, 2023 the site was vacant and covered in a light growth of grass. Some relatively mature trees and utility covers were observed on the eastern end of the site.

Topography across the site was relatively flat with surface elevations of approximately +12 feet in reference to the North American Vertical Datum of 1988 (NAVD88), based on the United States Geologic Survey (USGS) data shown on the *7.5-Minute Series Lodi South Quadrangle, California* topographic map, dated 2021.

2.2 Historical Aerial Photograph Review

We reviewed historical aerial photographs of the site from Google Earth Pro and the website HistoricalAerials.com. Photographs were available from the years 1947 through 2023. Our historical aerial review indicates the site has been used for agricultural purposes since at least 1957. Photographs taken between 1984 and 1993 revealed the construction of the school campus. A photograph of 1998 shows the site is being occupied by a baseball diamond. The baseball diamond is no longer visible in a photograph from 2008. The 2008 photograph shows the baseball diamond has been removed and the site is under construction. A 2009 photograph shows the is not used as a soccer field. The soccer field is visible in aerial photographs through 2022. In 2022, the north end of the soccer field is covered in what appears to be gravel and concrete pavements and three structures are located at the site, just north of the proposed agricultural building. The site has remained essentially unchanged from 2022 until the time of our field exploration in May of 2023.

2.3 Soil Conditions

On May 10, 2023, four soil borings (D1 through D4) were performed at the approximate locations indicated on Figure 2 to depths between 6½ to 16½ feet below existing ground surface (bgs).

The near-surface soil conditions encountered at the boring locations generally consists of dark brown, lean clay or brown, silty sand ranging from 2½ to 6½ feet bgs. Beneath the sand and clay were brown silty sand or sandy silt to the explored depth 16½ feet bgs.

For detailed soil conditions at a particular location, please refer to the Logs of Soil Borings presented in Figures 3 through 6.

2.4 Groundwater

Groundwater was not encountered within the borings performed on May 10, 2023, to the explored depths of about 6½ 16½-feet bgs.

To supplement our study, we reviewed available groundwater elevation data obtained from a California Department of Water Resources (DWR) monitoring well as identified as State Well Number 02N06E06C002M, located about ½-mile northwest of the site. The ground surface elevation at the well is +9 NAVD88, which is about three feet lower than the site. Groundwater measurements obtained from the well indicate a "high" groundwater elevation of -9 feet NAVD88 (about 18 feet bgs at the well) occurred on October 29, 2006, and a "low" groundwater elevation of approximately -23 feet (about 23 feet below bgs at the well) occurred on October 27, 2008.

Based on our observations, review of historical data, and experience in the area, we anticipate permanent groundwater will be encountered as high as about 20 feet below the existing ground surface.

3.0 CONCLUSIONS

3.1 2022 CBC and ASCE 7-16 Seismic Design Parameters

The 2022 *California Building Code* (CBC) references the American Society of Civil Engineers (ASCE) Standard 7-16 for seismic design. Based on the soil conditions encountered at the exploration locations and our experience in the local area, in our opinion the site can be designated as Site Class D in determining seismic design forces for this project.

The seismic design parameters provided in Table 1 were based on the latitude and longitude for the central portion of the site using the web interface developed by the *Structural Engineers Association of California* (SEAOC) and *California Department of Health Care Access and Information* (HCAi). Since S_1 is greater than 0.2 g, the coefficient values F_v, S_{M1}, and S_{D1} presented in Table 1 are valid for this project, provided the requirements in Exception Note No. 2 of Section 11.4.8 of *ASCE 7-16* apply. Based on our experience with similar projects, we anticipate the proposed improvements will meet the exception. However, the project structural engineer should verify the exception is met.

Table 1: ASCE 7-16 Seismic Design Parameters

Latitude: 38.05118° N Longitude: 121.3553° W	ASCE 7-16 Table/Figure	2022 CBC Table/Figure	Factor/Coefficient	Value
Short-Period MCE_R at 0.2 second	Figure 22-1	Figure 1613.2.1(1) & 1613.2.1(2)	S_S	0.724 g
1.0 second Period MCE_R	Figure 22-2	Figure 1613.2.1(3) & 1613.2.1(4)	S_1	0.285 g
Soil Class	Table 20.3-1	Section 1613.2.2	Site Class	D
Site Coefficient	Table 11.4-1	Table 1613.2.3(1)	F_a	1.221
Site Coefficient	Table 11.4-2	Table 1613.2.3(2)	F_v	2.030*
Adjusted MCE Spectral Response Parameters	Equation 11.4-1	Equation 16-20	S_{MS}	0.884 g
	Equation 11.4-2	Equation 16-21	S_{M1}	0.579 g*
Design Spectral Acceleration Parameters	Equation 11.4-3	Equation 16-22	S_{DS}	0.589 g
	Equation 11.4-4	Equation 16-23	S_{D1}	0.386 g*
Seismic Design Category	Table 11.6-1	Section 1613.2.5(1)	Risk Category I – IV	D
	Table 11.6-2	Section 1613.2.5(2)	Risk Category I - IV	D

Notes: MCE = Maximum Considered Earthquake; g = gravity

* The value is valid provided the requirements in Exception Note No. 2 in Section 11.4.8 of ASCE 7-16 are met. If not, a site-specific ground motion hazard analysis is required.

3.2 Liquefaction Potential

Based upon the results of our subsurface exploration, the known site geologic, seismologic, groundwater and soil conditions, it is our opinion that the potential for liquefaction occurring at this site is relatively low.

3.3 Soil Expansion Potential

Laboratory testing of soils collected at the boring locations revealed the near-surface soil possesses “low” expansion potential when testing in accordance with the ASTM International D4829 test method (Figures A1 and A2).

Based on the laboratory test results and soil conditions encountered at the boring locations, specific recommendations to mitigate the effects of expansive soils will not be required for development of this site.

3.4 Bearing Capacity

Based upon our field and laboratory testing, it is our opinion the native soils are capable of supporting the planned structures provided the recommendations in this report are followed. Our work also indicates engineered fills composed of native soils or approved imported soils constructed in accordance with our recommendations also will be capable of supporting the planned improvements.

3.5 Excavation Conditions

The surface and near-surface soils at the site should be readily excavatable with conventional earthmoving and trenching equipment. Based on the explorations performed at the site, excavations associated with building foundations, shallow trenches for utilities, and other excavations less than five feet deep associated with the planned construction, should stand vertically for short periods of time (i.e., less than one to two days) required for construction. However saturated, cohesionless, or disturbed soils, if encountered may result in caving or sloughing; therefore, the contractor should be prepared to brace or shore the excavations, if necessary.

Excavations or trenches exceeding five feet in depth that will be entered by workers should be sloped, braced or shored to conform to current California Occupational Safety and Health Administration (Cal/OSHA) requirements. The contractor must provide an adequately constructed and braced shoring system in accordance with federal, state, and local safety regulations for individuals working in an excavation that may expose them to the danger of moving ground.

Temporarily sloped excavations less than 15 feet in depth should be constructed no steeper than two horizontal to one vertical (2H:1V) inclination. Temporary slopes likely will stand at this inclination for the short-term duration of construction, provided significant pockets of loose and/or saturated granular soils are not encountered. Flatter slopes would be required if these conditions are encountered.

Excavated materials should not be stockpiled directly adjacent to an open excavation to prevent surcharge loading of the excavation sidewalls. Excessive truck and equipment traffic should be avoided near excavations. If material is stored or heavy equipment is stationed and/or operated near an excavation, a shoring system must be designed to resist the additional pressure due to the superimposed loads.

3.6 Material Suitability for Engineered Fill Construction

The existing on-site native soils encountered at the boring locations are considered suitable for use as engineered fill construction, provided these materials do not contain significant quantities of organics,

rubble and deleterious debris, and are at a proper moisture content capable of achieving the desired degree of compaction. Imported materials, if necessary, should be granular and approved by our office prior to importing the materials to the site.

3.7 Pavement Subgrade Quality

Laboratory test results indicate the near-surface soils are relatively poor to moderate quality materials for support of asphalt concrete pavements. Laboratory tests indicate that the near-surface soils possess Resistance ("R") values of 12 and 20 when tested in accordance with California Test 301. The results of the R-value tests are presented in Figure A3. Based on the results, an R-Value of 10 was used in our pavement design.

3.8 Preliminary Soil Corrosion Potential

One sample of near-surface soil was submitted to Sunland Analytical of Rancho Cordova, California, for testing to determine pH, chloride and sulfate concentrations, and minimum resistivity to help evaluate the potential for corrosive attack upon buried concrete. The results of the corrosivity testing are summarized below in Table 2. Copies of the test reports are presented in Figure A4.

Table 2: Soil Corrosivity Testing

Analyte	Test Method	Sample Identification
		D1 (0-3')
pH	CA DOT 643 Modified*	7.68
Minimum Resistivity	CA DOT 643 Modified*	2,010 Ω-cm
Chloride	CA DOT 422m	2.7 ppm
Sulfate	CA DOT 417	13.4 ppm

Notes: * = Small cell method; Ω-cm = Ohm-centimeters; ppm = Parts per million

The California Department of Transportation Corrosion and Structural Concrete Field Investigation Branch, Corrosion Guidelines (Version 3.2, dated May 2021), considers a site to be corrosive to foundation elements if one or more of the following conditions exists for the representative soil and/or water samples taken: has a chloride concentration greater than or equal to 500 ppm, sulfate concentration greater than or equal to 1500 ppm, or the pH is 5.5 or less. Based on this criterion, the on-site soils tested are not considered corrosive to steel reinforcement properly embedded within Portland cement concrete (PCC).

Table 19.3.1.1 – Exposure Categories and Classes, of American Concrete Institute (ACI) 318-19, Section 19.3 – Concrete Durability Requirements, as referenced in Section 1904.1 of the 2022 CBC, indicates the severity of sulfate exposure for the sample tested is Exposure Class S0 (water-soluble sulfate concentration in contact with concrete is low and injurious sulfate attack is not a concern). The project Structural Engineer should evaluate the requirements of ACI 318-19 and determine their applicability to the site.

UES are not corrosion engineers. Therefore, if it is desired to further define the soil corrosion potential at the site, a Corrosion Engineer should be consulted.

3.9 Groundwater Conditions and Seasonal Moisture

Based upon the absence of groundwater during our field exploration and published information regarding groundwater elevations in the vicinity, we conclude that a permanent groundwater level should not be a significant factor in the design or construction of foundation and/or utility excavations less than about 10 feet below the ground surface. However, saturation of near-surface soils maybe encountered from rainfall, surface run-off, irrigation, or seepage from perched groundwater sources. In general, standard sump pit and pumping procedures should be adequate to control localized seepage for shallow excavations, if encountered.

Grading operations attempted following the on-set of winter rains and prior to prolonged drying periods will be hampered by high soil moisture contents. Such soils, intended for use as engineered fill, will require considerable drying and aeration to reach a moisture content that will permit the specified degree of compaction to be achieved.

4.0 RECOMMENDATIONS

4.1 General

The recommendations presented below are appropriate for typical construction in the late spring through fall months. The on-site soils likely will be saturated by rainfall in the winter and early spring months and will not be compactable without drying by aeration or chemical treatment to dry the soils. Should the construction schedule require work during wet conditions, additional recommendations can be provided, as conditions dictate.

Site preparation should be accomplished in accordance with the provisions of this report. The Geotechnical Engineer's representative should be present during site grading to evaluate compliance with the above recommendations. The Geotechnical Engineer of Record referenced herein should be considered the Geotechnical Engineer that is retained to provide geotechnical engineering observation and testing services during construction.

4.2 Site Clearing

Initially, the site should be cleared of significant vegetation, debris, and other deleterious materials to expose undisturbed native soils. The deleterious material should be removed from the site. Following clearing operations, any remaining surface vegetation and organically contaminated topsoil should be removed by stripping. Strippings may be stockpiled for later use or disposed of off-site. Strippings should not be used in general fill construction, but may be used in non-structural areas, provided they are kept at least five feet from structural areas, moisture conditioned and compacted.

Discing of the organics into the surface soils may be a suitable alternate to stripping, depending on the condition and quantity of the organics at the time of grading. The decision to utilize discing in lieu of stripping should be made by the field representative of the Geotechnical Engineer at the time of earthwork construction. Discing operations, if approved, should be observed by the Geotechnical Engineer's representative and be continuous until the organics are adequately mixed into the surface soils to provide a compactable mixture of soil containing minor amounts of organic matter. Pockets or concentrations of organics will not be allowed.

Removal of trees, if any should include rootballs and roots larger than ½-inch in diameter. Adequate removal of debris and roots may require laborers and handpicking to clear the subgrade soils to the satisfaction of the Geotechnical Engineer's on-site representative.

Existing underground utilities within the proposed building pad should be completely removed and/or rerouted as necessary. Any existing underground utilities designated to be removed or relocated should include all trench backfill and be replaced with engineered fill. Utilities located outside the building areas should be properly abandoned (i.e., fully grouted provided the abandoned utility is situated at least 2½ feet below the final subgrade level to reduce the potential for localized "hard spots").

Depressions resulting from clearing operations, as well as any loose, saturated, or organically contaminated soils, if any, as identified by the Geotechnical Engineer's representative, should be cleaned out to expose firm, undisturbed soils and widened, as necessary, to allow access for construction equipment. Depressions should be backfilled with engineered fill in accordance with the recommendations in this report.

4.3 Subgrade Preparation

Following the site clearing operations, surfaces to receive fill and at-grade areas to receive improvements should be scarified to a depth of at least 12 inches, moisture conditioned to at least the optimum moisture content, and compacted to at least 90 percent relative compaction. Relative compaction should be based on the maximum dry density as determined in accordance with the American Society of Testing and Materials (ASTM) D1557 Test Method.

Compaction of soil subgrades should be achieved using compaction equipment capable of achieving the desired degree of compaction and must be performed in the presence of the Geotechnical Engineer's representative who will evaluate the performance of the subgrade under the compaction loads and identify loose or unstable soil conditions that could require excavation. Difficulty in achieving subgrade compaction or unusual soil instability may be indications of loose soils. Should these conditions exist, the materials should be excavated to check for possible subsurface structures and the excavations backfilled with engineered fill.

The upper 12 inches of final subgrade supporting the building pad should be compacted to at least 90 percent relative compaction.

Final pavement subgrade processing and compaction should be performed after completion of underground utilities. Pavement subgrades must be stable under construction traffic prior to placement of engineered fill. The upper six inches of pavement subgrade should be moisture conditioned to at least the optimum moisture content and compacted to at least 95 percent relative compaction regardless of whether final subgrade is achieved by excavation, filling or left at existing grade.

If loose, soft, or saturated soils are encountered during the subgrade preparation operations they should be properly remediated (i.e., scarified and compacted) or excavated to expose firm, undisturbed native materials. Any resulting excavations should be restored to grade with engineered fill meeting the requirements provided in the Engineered Fill Construction section of this report.

4.4 Engineered Fill Construction

On-site soils are suitable for engineered fill construction in structural areas provided the materials do not contain rubbish, rubble greater than three inches, and significant organic concentrations. Imported fill materials, if required, should be compactable, non-expansive granular soils, and contain no particles greater than three inches in maximum dimension. Imported soils should be approved by the Geotechnical Engineer prior to being transported to the site. Also, if import fills are required (other than aggregate base), the contractor must provide appropriate documentation that the import is clean of

known contamination per Department of Toxic Substances Control (DTSC) and within acceptable corrosion limits.

The fill comprised of native soils should be spread in level layers not exceeding eight inches in loose thickness with each lift being thoroughly moisture conditioned to at least the optimum moisture content and uniformly compacted to at least 90 percent relative compaction within building pad and exterior flatwork areas and a minimum of 95 percent of the maximum dry density within the upper six inches of the final pavement subgrade.

Subgrades for support of concrete slabs-on-grade and pavements should be protected from disturbance and/or desiccation until covered by capillary break material or aggregate base. Disturbed subgrade soils may require additional processing and recompaction, depending on the level of disturbance.

We recommend the Geotechnical Engineer's representative be present on a regular basis during all earthwork operations to observe and test the engineered fill and to verify compliance with the recommendations of this report and the project plans and specifications.

Permanent excavation and fill slopes should be constructed no steeper than two horizontal to one vertical (2:1) and should be vegetated as soon as practical following grading to minimize erosion. As a minimum, the following erosion control measures should be considered: placement of straw bale sediment barriers or construction of silt filter fences in areas where surface run-off may be concentrated. Slopes should be over-built and cutback to design grades and inclinations.

4.5 Foundation Design

The proposed agricultural science building may be supported upon conventional continuous and/or isolated spread foundations extending at least 18 inches below lowest adjacent soil grade. Lowest adjacent soil grade is defined as the grade upon which the capillary break material is placed or exterior soil grade, whichever is lower. All continuous foundations should maintain a minimum width of 12 inches; isolated spread foundations should also be at least 12 inches in plan dimension.

Foundations bearing on undisturbed native soils, engineered fill, or a combination of those materials may be sized for maximum allowable "net" soil bearing pressures of 3000 pounds per square foot (psf) for dead plus live loads, with a 1/3 increase for total loads including the short-term effects of wind or seismic forces. The weight of the foundation concrete extending below lowest adjacent soil grade may be disregarded in sizing computations.

We recommend that all foundations be adequately reinforced to provide structural continuity, mitigate cracking and permit spanning of local soil irregularities. The structural engineer or civil engineering consultant should determine final foundation reinforcing requirements.

Resistance to lateral foundation displacement may be computed using an allowable friction factor of 0.30, which may be multiplied by the effective vertical load on each foundation. Additional lateral resistance may be computed using an allowable passive lateral earth pressure against the vertical projection of foundations equal to an equivalent fluid pressure of 300 psf per foot of depth. These two modes of resistance should not be added unless the frictional component is reduced by 50 percent since full mobilization of these resistances may occur at different degrees of horizontal movement.

4.6 Interior Floor Slab Support

Interior concrete slab-on-grade floors can be supported upon the soil subgrade prepared in accordance with the recommendations in this report and maintained in that condition (at least above the optimum moisture content) and are protected from disturbance. Slabs-on-grade should be at least four inches thick, with the final thickness, reinforcement and joint spacing of the slab determined by the project Structural Engineer or slab designer. Proper and consistent location of the reinforcement near mid-slab is essential to its performance. The risk of uncontrolled shrinkage cracking is increased if the reinforcement is not properly located within the slab. Temporary loads exerted during construction from vehicle traffic, construction equipment, storage of palletized construction materials, etc., should be considered in the design of the thickness and reinforcement of the interior slab.

Floor slabs may be underlain by a layer of free-draining crushed rock, serving as a deterrent to migration of capillary moisture. The crushed rock layer should be four to six inches thick and graded such that 100 percent passes a one-inch sieve and no appreciable amount passes a No. 4 sieve. Additional moisture protection may be provided by placing a vapor retarder membrane (at least 10 mils thick) directly over the crushed rock. The membrane should meet or exceed the minimum specifications as outlined in ASTM E1745 and be installed in strict conformance with the manufacturer's recommendations.

Floor slab construction over the past 30 years or more has included placement of a thin layer of sand or pea gravel over the vapor retarder membrane. The intent of the sand/pea gravel is to aid in the proper curing of the slab concrete and is not required from a geotechnical support perspective. However, recent debate over excessive moisture vapor emissions from floor slabs includes concern for water trapped within the sand/pea gravel. Therefore, we consider the use of the sand/pea gravel layer as optional and not required from a geotechnical perspective. The concrete curing benefits should be weighed against efforts to reduce slab moisture vapor transmission.

The recommendations presented above are intended to mitigate any significant soils-related cracking of the slab-on-grade floors. More important to the performance and appearance of a Portland cement concrete slab is the quality of the concrete, the workmanship of the concrete contractor, the curing techniques utilized, and the spacing of control joints.

4.7 Floor Slab Moisture Penetration Resistance

It is considered likely that floor slab subgrade soils will become wet to near saturated at some time during the life of the structure. This is a certainty when slabs are constructed during the wet seasons, or when constantly wet ground or poor drainage conditions exist adjacent to the structure. For this reason, it should be assumed that interior slabs intended for moisture-sensitive floor coverings or materials, require protection against moisture or moisture vapor penetration, mold formation. Standard practice includes the gravel/crushed rock and vapor retarder as suggested above. However, the gravel/crushed rock and plastic membrane offer only a limited, first line of defense against soil-related moisture; they do not moisture-proof the slab.

It is emphasized that the use of a membrane below the slab will not "moisture proof" the slab, nor does it assure that slab moisture transmission levels will be low enough to prevent damage to floor coverings or other building components, or mold formation. If increased protection against moisture vapor penetration of slabs is desired, a concrete moisture protection specialist should be consulted. It is commonly accepted that maintaining the lowest practical water-cement ratio in the slab concrete is one of the most effective ways to reduce future moisture vapor penetration of the completed slabs.

4.8 Utility Trench Backfill

Utility trench backfill should be mechanically compacted as engineered fill in accordance with the following recommendations. Bedding of utilities and initial backfill around and over the pipe should be in accordance with the manufacturer’s recommendations for the pipe materials selected, and applicable San Joaquin County requirements. Utility trench backfilling should be continuously observed by a representative of the Geotechnical Engineer during construction.

Utility trench backfill should be placed in relatively thin lifts, moisture conditioned to at least the optimum moisture content and mechanically compacted to at least 90 percent of the ASTM D1557 maximum dry density. The actual lift thickness used will depend on the compaction equipment used but should not be more than six inches (compacted thickness). Within the upper six inches of pavement areas, the minimum compaction should be increased to 95 percent of ASTM D1557.

We recommend that underground utility trenches that are aligned nearly parallel with foundations be at least three feet from the outer edge of foundations, wherever possible. Trenches should not encroach into the zone extending outward at a one horizontal to one vertical (1H:1V) inclination below the bottom of the foundations. Additionally, trenches parallel to existing foundations should not remain open longer than 72 hours. The intent of these recommendations is to prevent loss of both lateral and vertical support of foundations, resulting in possible settlement.

4.9 Exterior Flatwork Construction

Soil subgrade areas to support exterior concrete flatwork should be prepared in accordance with the recommendations presented in the Subgrade Preparation and Engineered Fill Construction sections of this report. Exterior flatwork subgrade soils should be maintained in a moist condition (at least above the optimum moisture content) and protected from disturbance. If this is not the case and subgrade soils become dry and/or disturbed, the exterior flatwork subgrade will require additional scarification, moisture conditioning and compaction prior to construction of the exterior flatwork.

Exterior flatwork should be underlain by at least four inches of aggregate base compacted to at least 95 percent relative compaction (ASTM D1557). The aggregate base should be placed over the prepared subgrade soil compacted to at least 90 percent relative compaction.

Exterior flatwork should be at least four inches thick and reinforced for crack control. The architect or project Civil Engineer should determine the final thickness, strength, reinforcement, and joint spacing of exterior slab-on-grade concrete. Exterior flatwork next to landscaped areas should be thickened to twice the slab thickness for a width of at least six inches to help support lawn mowing equipment and other maintenance equipment. Accurate and consistent location of the reinforcement at mid-slab is essential to its performance and the risk of uncontrolled drying shrinkage slab cracking is increased if the reinforcement is not properly located within the slab.

Uniform moisture conditioning of subgrade soils is important to reduce the risk of non-uniform moisture withdrawal from the concrete and the possibility of plastic shrinkage cracks. Practices recommended by the Portland Cement Association (PCA) for proper placement and curing of concrete should be followed during exterior concrete flatwork construction. Flatwork should be independent of the building foundations and felt strips should be used to separate concrete slabs from building foundations.

Exterior flatwork that will be traversed by vehicles or heavy equipment may require a thicker concrete and/or aggregate base section, depending on the actual traffic loading conditions. Additional recommendations for concrete flatwork that will support vehicular traffic can be provided at a later date.

4.10 Pavement Design

Based on laboratory test results, we used a Resistance ("R") value of 10 for asphalt pavement design. Pavement sections presented in Table 3 have been calculated using the above R-values and traffic indices (TIs) assumed to be appropriate for this project. The project civil engineer should determine the appropriate traffic index for pavements based on anticipated traffic conditions. If needed, we can provide additional pavement sections for different traffic indices.

Table 3 - Pavement Design Alternatives for Asphalt Concrete Pavements

Traffic Index (TI)	Pavement Use	Soil Subgrades R-value = 10	
		Type B Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)
4.5	Automobile Parking Only	2½*	9
6.5	Drive Aisles and Light to Moderate Truck Traffic and Fire Lanes	3	15
		4*	13

** = Asphalt concrete thickness contains the Caltrans safety factor.*

We emphasize that the performance of pavement is critically dependent upon uniform and adequate compaction of the soil subgrade, as well as all engineered fill and utility trench backfill within the limits of the pavements. We recommend that pavement subgrade preparation (i.e., scarification, moisture conditioning and compaction) be performed after underground utility construction is completed and just prior to aggregate base placement. The upper six inches of pavement subgrade soils should be compacted to at least 95 percent relative compaction at no less than the optimum moisture content. All aggregate base should be compacted to at least 95 percent relative compaction.

Pavement subgrades should be stable and unyielding under heavy wheel loads of construction equipment. To help identify unstable subgrades within the pavement limits, a proof-roll should be performed with a fully-loaded water truck (or equivalent) on the exposed subgrades prior to placement of aggregate base. The proof-roll should be observed by the Geotechnical Engineer's representative.

All pavement materials and construction methods of structural pavement sections should conform to the applicable provisions of the Caltrans Standard Specifications, latest edition.

Pavement Drainage

Efficient drainage of all surface water to avoid infiltration and saturation of the supporting aggregate base and subgrade soils is important to pavement performance. Weep holes could be provided at drainage inlets, located at the subgrade-base interface, to allow accumulated water to drain from beneath the pavements.

Consideration should be given to using full-depth curbs between landscaped areas and pavements to serve as a cut off for water that could migrate into the pavement base materials or subgrade soils.

4.11 Site Drainage

Final site grading should be accomplished to provide positive drainage of surface water away from the structures and prevent ponding of water adjacent to the foundations. The grade adjacent to the structures should be sloped away from foundations at a minimum two percent slope for a distance of at least five feet, where possible. Ponding of surface water should not be allowed adjacent to the structure or exterior concrete flatwork.

4.12 Drought Considerations

The State of California can experience extended periods of severe drought conditions in the future. The ability for landowners to use irrigation as a means for maintaining landscape vegetation and soil moisture likely will be inhibited for unpredictable periods of time. For this reason, landscape and hardscape systems for this development should be carefully planned to prevent the desiccation of soils under and near foundations and slabs. Trees with invasive shallow root systems should be avoided. No trees or large shrubs that could remove soil moisture during dry periods should be planted within five feet of any foundation or slab. Fallow ground adjacent to foundations must be avoided

4.13 Geotechnical Engineering Construction Observation Services

Site preparation should be accomplished in accordance with the recommendations of this report. Representatives of the Geotechnical Engineer should be present during site preparation and all grading operations to observe and test the fill to verify compliance with our recommendations and the job specifications. Testing frequency will depend on how the site is graded and should be determined

during the rough grading operations. These services are beyond the scope of work authorized for this investigation.

In the event that UES is not retained to provide geotechnical engineering observation and testing services during construction, the Geotechnical Engineer retained to provide these services should indicate in writing that they agree with the recommendations of this report or prepare supplemental recommendations as necessary. A final report by the Geotechnical Engineer providing construction testing services should be prepared upon completion of the project.

5.0 LIMITATIONS

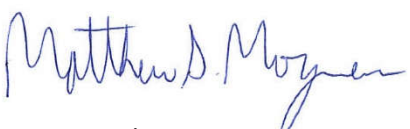
Our recommendations are based upon the information provided regarding the proposed project, combined with our analysis of site conditions revealed by the field exploration and laboratory testing programs. We have used our engineering judgment based upon the information provided and the data generated from our investigation. This report has been prepared in substantial compliance with generally accepted geotechnical engineering practices that exist in the area of the project at the time the report was prepared. No warranty, either express or implied, is provided.

If the proposed construction is modified or re-sited; or, if it is found during construction that subsurface conditions differ from those we encountered at the boring locations, we should be afforded the opportunity to review the new information or changed conditions to determine if our conclusions and recommendations must be modified.

We emphasize that this report is applicable only to the proposed construction and the investigated site, and should not be utilized for construction on any other site. The conclusions and recommendations of this report are considered valid for a period of two years. If design is not completed and construction has not started within two years of the date of this report, the report must be reviewed and updated if necessary.

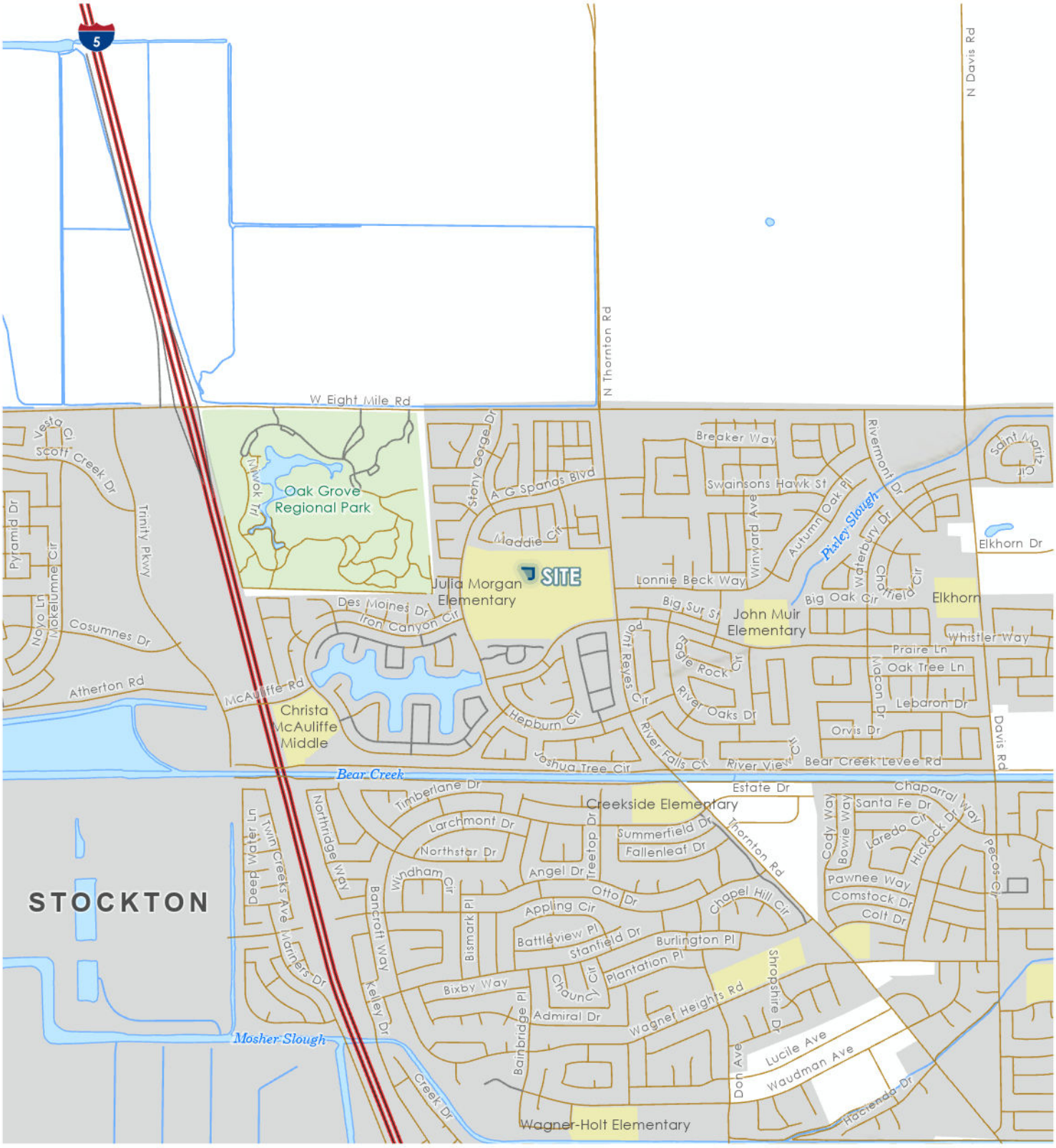
Universal Engineering Sciences (UES),

Guang H. Zhu
Staff Engineer



Matthew S. Moyneur
Senior Engineer

FIGURES



N

0 1,000 2,000

Feet

Spatial Data provided by Esri, NOAA, and USGS.
Projection: NAD 1983 2011 StatePlane California II FIPS 0402 Ft US

UES

VICINITY MAP

BEAR CREEK HIGH SCHOOL AGRICULTURAL SCIENCE BUILDING

Stockton, California

FIGURE	1
DRAWN BY	GHZ
CHECKED BY	GHZ
PROJECT MGR	MSM
DATE	06/2023
4730.2300012.0016	

Approximate Site Boundary

Approximate Boring Location

N

0 40 80

Feet

Aerial imagery provided by Esri.
Projection: NAD 1983 2011 StatePlane California II FIPS 0402 Ft US

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SITE PLAN

BEAR CREEK HIGH SCHOOL AGRICULTURAL SCIENCE BUILDING

Stockton, California

FIGURE	2
DRAWN BY	GHZ
CHECKED BY	GHZ
PROJECT MGR	MSM
DATE	06/2023
4730.2300012.0016	

Project: Bear Creek High School Agricultural Science Building
Project Location: Stockton, California
Project Number: 4730.2300012.0016

LOG OF SOIL BORING D1

Sheet 1 of 1

Date(s) Drilled	**5/10/23**	Logged By	**GHZ**	Checked By	**MSM**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**15.0 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet	**N/A**	Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Neat Cement**
Remarks	**Bulk (0-3')**			Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
	0		Dark brown, moist, very stiff, lean CLAY (CL)						
	1								
	2				D1 (0-3')				EI = 41
	3		Brown, moist, medium dense, silty fine to medium SAND (SM)		D1-1I	23	14	97	PP = 3.0 tsf
	4								
	5								
	6				D1-2I	14	15	104	
	7								
	8								
	9				D1-3I	30	12	120	
	10								
	11								
	12								
	13								
	14		fine to coarse sand, decreased fines content		D1-4I	28	5	99	
	15		Boring terminated at approximately 15 feet below existing ground surface. Groundwater was not encountered.						

BORING LOG 4730.2300012.0016 - BEAR CREEK HIGH SCHOOL AG SCIENCE BUILDING.GPJ WKA.GDT 6/9/23 2:50 PM

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FIGURE 3

Project: Bear Creek High School Agricultural Science Building
Project Location: Stockton, California
Project Number: 4730.2300012.0016

LOG OF SOIL BORING D2

Sheet 1 of 1

Date(s) Drilled	**5/10/23**	Logged By	**GHZ**	Checked By	**MSM**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**6.5 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet	**N/A**	Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Neat Cement**
Remarks	**Bulk (0-3')**			Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
	1		Brown, moist, dense, silty fine to medium SAND (SM)						
	2				D2 (0-3')				
	3				D2-1I	49	14	110	
	4								
	5								
	6		medium dense		D2-2I	31	19	105	
			Boring terminated at approximately 6½ feet below existing ground surface. Groundwater was not encountered.						

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FIGURE 4

Project: Bear Creek High School Agricultural Science Building
Project Location: Stockton, California
Project Number: 4730.2300012.0016

LOG OF SOIL BORING D3

Sheet 1 of 1

Date(s) Drilled	**5/10/23**	Logged By	**GHZ**	Checked By	**MSM**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**6.5 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet	**N/A**	Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Neat Cement**
Remarks	**Bulk (0-3')**			Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
	1		Brown, moist, dense, silty fine to coarse SAND (SM)						
	2				D3 (0-3')				RV = 20
	3				D3-1I	38	15	109	
	4								
	5								
	6				D3-2I	42	26	95	
			Brown with reddish brown mottling, moist, dense, sandy SILT (ML)						
			Boring terminated at approximately 6½ feet below existing ground surface. Groundwater was not encountered.						

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FIGURE 5

Project: Bear Creek High School Agricultural Science Building
Project Location: Stockton, California
Project Number: 4730.2300012.0016

LOG OF SOIL BORING D4

Sheet 1 of 1

Date(s) Drilled	**5/10/23**	Logged By	**GHZ**	Checked By	**MSM**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**16.5 feet**
Drill Rig Type	**CME 75**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet	**N/A**	Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Neat Cement**
Remarks	**Bulk (0-3')**			Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
	0		Dark brown, moist, very stiff, lean CLAY (CL) with sand						
	1				D4 (0-3')				EI = 41 RV = 12
	2								
	3				D4-1I	16	16	94	
	4		Light brown, moist, medium dense, silty fine to medium SAND (SM)						
	5		Brown, moist, dense, sandy SILT (ML)						
	6				D4-2I	42	27	93	
	7								
	8								
	9		Brown, moist, medium dense, silty fine to medium SAND (SM)						
	10								
	11				D4-3I	17	12	108	
	12								
	13								
	14								
	15								
	16		fine to coarse sand		D4-4I	19	7	104	
			Boring terminated at approximately 16½ feet below existing ground surface. Groundwater was not encountered.						

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FIGURE 6

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487)

MAJOR DIVISIONS		USCS[4]	CODE	CHARACTERISTICS
COARSE GRAINED SOILS (More than 50% of soil > no. 200 sieve size)	GRAVELS[1] (More than 50% of coarse fraction > no. 4 sieve size)	GW		Well-graded gravels or gravel - sand mixtures, trace or no fines
		GP		Poorly graded gravels or gravel - sand mixtures, trace or no fines
		GM		Silty gravels, gravel - sand - silt mixtures, containing little to some fines[2]
		GC		Clayey gravels, gravel - sand - clay mixtures, containing little to some fines[2]
	SANDS[1] (50% or more of coarse fraction < no. 4 sieve size)	SW		Well-graded sands or sand - gravel mixtures, trace or no fines
		SP		Poorly graded sands or sand - gravel mixtures, trace or no fines
		SM		Silty sands, sand - gravel - silt mixtures, containing little to some fines[2]
		SC		Clayey sands, sand - gravel - clay mixtures, containing little to some fines[2]
FINE GRAINED SOILS (50% or more of soil < no. 200 sieve size)	SILTS & CLAYS LL < 50	ML		Inorganic silts, gravely silts, and sandy silts that are non-plastic or with low plasticity
		CL		Inorganic lean clays, gravelly lean clays, sandy lean clays of low to medium plasticity[3]
		OL		Organic silts, organic lean clays, and organic silty clays
	SILTS & CLAYS LL ≥ 50	MH		Inorganic elastic silts, gravelly elastic silts, and sandy elastic silts
		CH		Inorganic fat clays, gravelly fat clays, sandy fat clays of medium to high plasticity
		OH		Organic fat clays, gravelly fat clays, sandy fat clays of medium to high plasticity
HIGHLY ORGANIC SOILS		PT		Peat
ROCK		RX		Rocks, weathered to fresh
FILL		FILL		Artificially placed fill material

OTHER SYMBOLS

= Drive Sample: 2-1/2" O.D. Modified California sampler

= Drive Sampler: no recovery

= SPT Sampler

= Initial Water Level

= Final Water Level

— — — = Estimated or gradational material change line

——— = Observed material change line

Laboratory Tests

CR = Corrosion
PI = Plasticity Index
EI = Expansion Index
UCC = Unconfined Compression Test (TSF)
TR = Triaxial Compression Test
GR = Gradational Analysis (Sieve/Hydro)
FC = Wash (Fines Content)
PP = Pocket Penetrometer Test (TSF)
PID = Photo Ionization Detector Test (PPM)
RV = Resistance ("R") Value

REF = Refusal (>50 blows in 6 inches)

GRAIN SIZE CLASSIFICATION

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDERS (b)	Above 12"	Above 300
COBBLES (c)	12" to 3"	300 to 75
GRAVEL (g) coarse fine	3" to No. 4 3" to 3/4" 3/4" to No. 4	75 to 4.75 75 to 19 19 to 4.75
SAND coarse medium fine	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200	4.75 to 0.075 4.75 to 2.00 2.00 to 0.425 0.425 to 0.075
SILT & CLAY	Below No. 200	Below 0.075

Trace - Less than 5 percent
Few - 5 to 10 percent
Little - 15 to 25 percent
Some - 35 to 45 percent
Mostly - 50 to 100 percent

* Percents as given in ASTM D2488

NOTES:

1. Coarse grained soils containing 5% to 12% fines, use dual classification symbol (ex. SP-SM).
2. If fines classify as CL-ML (4<PI<7), use dual symbol (ex. SC-SM).
3. Silty Clays, use dual symbol (CL-ML).
4. Borderline soils with uncertain classification list both classifications (ex. CL/ML).

UES

UNIFIED SOIL CLASSIFICATION SYSTEM

BEAR CREEK HIGH SCHOOL AGRICULTURAL SCIENCE BUILDING

Stockton, California

FIGURE	7
DRAWN BY	GHZ
CHECKED BY	MSM
PROJECT MGR	MSM
DATE	06/2023
4730.2300012.0016	

APPENDIX A

General Project Information, Laboratory Testing and Results

APPENDIX A

A. GENERAL INFORMATION

The performance of a geotechnical engineering study for the proposed Agricultural Science Building to be located within the existing Bear Creek High School campus located at 10555 Thornton Road in Stockton, California 95209 was authorized by Mr. Leonard Kahn with Lodi Unified School District (LUSD) on April 4, 2023. Authorization was for a study as described in our proposal letter dated April 4, 2023 sent to LUSD whose mailing address 1305 East Vine Street in Lodi, California 95240.

B. FIELD EXPLORATIONS

As part of our study for the proposed improvements, our field exploration included performing four soil borings (D1 through D4) at the approximate locations shown on Figure 2.

The soil borings were performed on May 10, 2023 to depths ranging from about 6½ to 16½ feet below existing site grades utilizing a CME-75 truck-mounted drilling rig equipped with six-inch-diameter solid flight augers. At various intervals soil samples were recovered with a 2½-inch outside diameter (O.D.), 2-inch inside diameter (I.D.), modified California split-spoon sampler. The sampler was driven by an automatic 140-pound hammer freely falling 30 inches. The number of blows of the hammer required to drive the 18-inch long samplers each six-inch interval were recorded. The sum of the blows required to drive the sampler the lower 12-inch interval is designated the penetration resistance or "blow count" for that particular drive.

The modified California samples were retained in 2-inch diameter by 6-inch long, thin walled brass tubes contained within the sampler. After recovery, the field representative visually classified the soil recovered in the tubes. After the samples were classified, the ends of the tubes were sealed to preserve the natural moisture contents.

Pocket penetrometer testing was performed during drilling operations on select cohesive soil samples obtained at the boring locations. In pocket penetrometer testing, the unconfined compressive strength of a cohesive soil sample is estimated by measuring the resistance of the sample to penetration of a relatively small, calibrated, spring-loaded cylinder. The maximum capacity of the penetrometer is 4.5 tons per square-foot (tsf). The unconfined compressive strength estimated from pocket penetrometer testing on the select cohesive soil samples is

included on the boring logs at the depth the sample tested was obtained. The approximate undrained shear strength of the samples tested is one-half of the unconfined compressive strength.

Descriptions of the soils encountered in the borings are presented on Figures 3 through 6. An explanation of the Unified Soil Classification System symbols used in the descriptions is presented on Figure 7.

C. LABORATORY TESTING

Selected soil samples were tested to determine dry unit weight (ASTM D2937) and natural moisture content (ASTM D4643). The results of these tests are included on the boring logs at the depth each sample was obtained.

Two samples of the near-surface soil were subjected to Expansion Index testing (ASTM D4829). The test results are presented in Figures A1 and A2.

Two bulk samples of near-surface soil were subjected to Resistance-value ("R") testing in accordance with California Test 301. The results of the R-value testing, which were used in the pavement design, is presented in Figure A3.

One sample of representative near-surface soil was submitted to Sunland Analytical to determine the soil pH and minimum resistivity (California Test 643), Sulfate concentration (California Test 417), and Chloride concentration (California Test 422). The test results are presented in Figure A4.

EXPANSION INDEX TEST RESULTS

ASTM D4829

MATERIAL DESCRIPTION: Dark brown, lean CLAY

LOCATION: D1

Sample Depth	Pre-Test Moisture (%)	Post-Test Moisture (%)	Dry Density (pcf)	Expansion Index
0 - 3'	9.0	14.8	112	**41**

CLASSIFICATION OF EXPANSIVE SOIL *

EXPANSION INDEX	POTENTIAL EXPANSION
0 - 20	Very Low
21 - 50	**Low**
51 - 90	Medium
91 - 130	High
Above 130	Very High

* From ASTM D4829, Table 1

UES

EXPANSION INDEX

BEAR CREEK HIGH SCHOOL AGRICULTURAL SCIENCE BUILDING

Stockton, California

FIGURE	A1
DRAWN BY	GHZ
CHECKED BY	MSM
PROJECT MGR	MSM
DATE	06/2023
4730.2300012.0016	

EXPANSION INDEX TEST RESULTS

ASTM D4829

MATERIAL DESCRIPTION: Dark brown, lean CLAY

LOCATION: D4

Sample Depth	Pre-Test Moisture (%)	Post-Test Moisture (%)	Dry Density (pcf)	Expansion Index
0 - 3'	10.0	17.7	109	**41**

CLASSIFICATION OF EXPANSIVE SOIL *

EXPANSION INDEX	POTENTIAL EXPANSION
0 - 20	Very Low
21 - 50	**Low**
51 - 90	Medium
91 - 130	High
Above 130	Very High

* From ASTM D4829, Table 1

UES

EXPANSION INDEX

BEAR CREEK HIGH SCHOOL AGRICULTURAL SCIENCE BUILDING

Stockton, California

FIGURE	A2
DRAWN BY	GHZ
CHECKED BY	MSM
PROJECT MGR	MSM
DATE	06/2023
4730.2300012.0016	

RESISTANCE VALUE TEST RESULTS

(California Test 301)

MATERIAL DESCRIPTION: Brown, silty SAND

LOCATION: D3 (0-3')

Specimen No.	Dry Unit Weight (pcf)	Moisture @ Compaction (%)	Exudation Pressure (psi)	Expansion (dial, inches x 1000)	Expansion (psf)	R Value
1	121	12.2	224	0	0	12
2	125	11.3	407	5	22	30
3	123	11.7	336	1	4	24

R-Value at 300 psi exudation pressure = 20

MATERIAL DESCRIPTION: Brown, lean CLAY with sand

LOCATION: D4 (0-3')

Specimen No.	Dry Unit Weight (pcf)	Moisture @ Compaction (%)	Exudation Pressure (psi)	Expansion (dial, inches x 1000)	Expansion (psf)	R Value
1	117	13.7	204	0	0	8
2	119	12.9	495	9	39	17
3	119	13.3	395	4	17	14

R-Value at 300 psi exudation pressure = 12

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RESISTANCE VALUE TEST RESULTS

BEAR CREEK HIGH SCHOOL AGRICULTURAL SCIENCE BUILDING

Stockton, California

FIGURE	A3
DRAWN BY	GHZ
CHECKED BY	GHZ
PROJECT MGR	MSM
DATE	06/2023
4730.2300012.0016	

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 05/17/2023
Date Submitted 05/12/2023

To: Guang Zhu
Universal Engineering Science
3050 Industrial Blvd
West Sacramento, CA 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 4730.2300012.0010 Site ID : D1 @ 0-3FT.
Thank you for your business.

* For future reference to this analysis please use SUN # 89609-186077.

EVALUATION FOR SOIL CORROSION

Soil pH	7.68	
Minimum Resistivity	2.01 ohm-cm (x1000)	
Chloride	2.7 ppm	00.00027 %
Sulfate	13.4 ppm	00.00134 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422m

UES

CORROSION TEST RESULTS

BEAR CREEK HIGH SCHOOL AGRICULTURAL SCIENCE BUILDING

Stockton, California

FIGURE	A4
DRAWN BY	GHZ
CHECKED BY	MSM
PROJECT MGR	MSM
DATE	06/2023

4730.2300012.0016

SECTION 27 10 00

TELECOMMUNICATIONS SPECIFICATIONS

PART 1 – GENERAL

1.1 INTRODUCTION

A. The following specifications are intended to assist in the development of a telecommunications system for accommodating present and future technologies within the Lodi Unified School District. They provide a set of instructions and materials needed to install a telecommunications system within parameters set by industry standards. The requirements for the structured cabling systems within the facilities are continued in this document.

1.2 WORK INCLUDED

A. Contractor shall design and provide all materials in order to install a complete and functional data/telecommunications and cable television infrastructure.

B. Only ONE Contractor shall be responsible for providing a complete and functional infrastructure, including necessary components and documentation.

C. Documentation will include MS Visio drawings showing room drop locations, cable runs, and conduit pathways. Data, voice, and coax cables are all part of the same infrastructure and shall all be installed, terminated, labeled, and documented by only one contractor (no exceptions).

1.3 CONTRACTOR QUALIFICATIONS

A. Must possess a valid C-7 California State contractor's license. This license must have been issued 2 years prior to the date of the bid. No other license classification is acceptable.

B. Must be able to prove to the satisfaction of LUSD that they have significant experience in the installation of fiber optic systems.

1. Proper installation of fiber optic cable

2. Fiber termination

3. Interconnecting equipment

4. Test procedures with appropriate documentation.

C. Must prove employees have been trained in the proper handling and cleanup of small quantities of lead paint. Contractor must contact Technology Services, prior to any work starting for an updated list of sites that require drilling work to be handled by a dedicated asbestos vendor. In the event Contractor encounters asbestos, stop work and notify district.

D. Must be in trade of installing telecommunication systems, continuously, for a period of at least 3 years prior to the date of this bid.

E. Must submit at least one project reference for each of the three years prior to the date of this bid.

F. Must provide a minimum of 3 references supporting a claim of experience for a similar project within 2 years prior to this bid. These project references shall contain the starting and ending contract price, the project foreman or superintendent's name, and the name, address, and telephone number of a project contact.

G. Must also provide a list of key installation personnel, their hire dates and a resume of their experience. Key installation personnel shall include at least one foreman and two journey level installers or technicians. By submitting the names of these personnel, contractor is committing them to the execution of the project outlined in this specification.

1.4 REQUIREMENTS

A. Drawings and General Provisions of the contract, including General and Supplementary Conditions and Division 1 Specifications Sections shall apply to work specified, in this Section.

B. Rules and Regulations

1. All work and materials shall be in full accordance with the latest rules and regulations of the following:

    a. EIA/TIA Standards
    b. BICSI Standards
    c. CEC Standards
    d. Title 24 (California Code of Regulation)
    e. All Local Codes
    f. LUSD Standards
    g. NFPA Standards
    h. ADA Requirements
    i. Safety, Health and Environmental Standards

C. Permits, Fees, and Inspections

1. Contractor shall be responsible for all fees and permits required to any governmental agency having jurisdiction over the work of this section. Contractor shall arrange inspections required by any local ordinances during construction. Upon completion of the work, satisfactory evidence shall be furnished to LUSD to show that all work has been installed in accordance with the code(s).

D. Examination of Site

1. Contractor shall be held to have visited the site and been satisfied with the conditions under which the work is to be performed. Contractor shall check existing conditions that may affect the work. If the contractor retains services of other firms, those firms shall investigate existing systems and determine labor

and other materials required to add devices or modify systems. No allowance shall subsequently be made on the contractor's behalf, for any extra expense resulting from a failure or neglect to discover conditions affecting the work.

E. Cleaning and Cleanup

1. All work areas shall be cleaned to remove all dust, dirt, grease, paint, or other marks. All electrical equipment shall be left in a clean condition inside and out, satisfactory to LUSD. Buildings and premises will be kept free from accumulated waste materials, rubbish and debris resulting from work. Upon completion of work: tools, appliances, surplus and waste materials, rubbish and/or debris will be removed and/or legally disposed of offsite.

F. Interruption of Services

1. The underground route may run through areas of existing underground irrigation, signal, power, gas, water and sewer.

2. Contractor must take precautions to avoid damaging/killing the root systems of existing trees. Contractor shall hand-dig as necessary to prevent disruption to existing systems, and make all repairs as required if damage occurred, at no additional cost to LUSD.

3. LUSD will make every effort to assist contractor in locating existing underground routes. However, contractor will be required to pothole and inspect as needed. Contractor is responsible for USA surveys (Underground Service Alert).

4. Power and signal services to existing buildings and related circuits are to remain in operation and shall not be interrupted, except by specific written approval from LUSD.

5. If it is deemed necessary to shutdown circuits for the installation of new work, such shutdowns shall be scheduled with LUSD who may at its choosing, have a representative present during shutdown. Shutdowns shall be scheduled "after hours" or on weekends when an interruption would not cause a disturbance to school activities. Any accidental interruption of service to circuits or equipment as a result of work performed by the contractor shall be restored immediately in a manner acceptable to LUSD, at the contractor's expense.

G. Cooperation and Coordination

1. Contractor shall be solely responsible for instituting and maintaining safe working conditions for the project area under construction. Noise, dust, and other nuisance control measures will be implemented as effectively as possible. Work will be executed at a time when the space required by this installation is accessible. Adequate barrier and trench covers will be provided, and no equipment will be left unattended, ensuring the safety of students and staff.

H. Inspection

1. Contractor shall cooperate with the LUSD Designer/Inspector and provide assistance at all times for inspection of the work performed under this contract.

Work that will be contained behind or under access covers, ground covering, or similar impediments shall be left exposed until inspected by LUSD. Contractor shall remove covers, operate devices, or perform any reasonable work that, in the opinion of LUSD, will be necessary to determine the quality and adequacy of the work.

I. Manufacturers Direction

1. Contractor shall follow manufacturer's directions that cover points not included in the drawings or specifications.

J. Workmanship

1. Contractor shall take all precautions necessary to protect existing structures. Structures or items to remain that are damaged during the course of work, shall be repaired or replaced by the contractor. Good workmanship shall be evident by the proper installation of all materials and equipment. Equipment shall be level, plumb and true with the structure and other equipment. All materials shall be firmly secured in place, adequately supported and permanent.

K. Contractor's Supervision

1. Contractor shall personally, or through an authorized and competent representative, constantly supervise the work from its commencement to its completion and acceptance. Contractor shall have the same foreman and workers on the job from its commencement to it completion, as much as possible. LUSD shall be notified of any personnel changes and supplied with the proper documents for any new personnel (I.e. lead certificates). All non-LUSD personnel shall be identified either by an ID tag or uniform with a company logo when on school grounds.

L. Scheduling of Work

1. Due to its nature, this work will have to proceed with a definite sequence of operations to minimize outages and continue facilities to all areas. The site will remain in operation during the work, and the contractor shall make every effort to maintain required services.

M. Guarantees

1. Acceptance of the contract for this work includes this guarantee: Contractor guarantees that he has performed the work in accordance with the contract documents. Contractor also agrees to replace or repair, as new, any defective work, materials, or parts which appears within 4 years of final payment. LUSD will make the final determination of whether any defects are the responsibility of the contractor to replace or repair.

2. Warranties, guarantees and certificates shall be provided for equipment and materials furnished and installed, as of the date of final payment and be delivered to LUSD. A set of "As Built" Visio drawings and test results for all installed cabling shall be provided to LUSD, before the project will be considered complete.

3. Panduit Pan-Net Performance Guarantee - Contractor shall provide a 25 year application performance warranty for all Panduit Pan-Net copper cable and connectivity products. The system must be installed to meet all TIA/EIA commercial building wiring standards and installed per appropriate Panduit instruction sheets. If any Panduit product fails to perform as stated above, Panduit will provide new components at no charge.

1.5 SUBMITTALS AND SUBSTITUTIONS

A. LUSD has evaluated and approved all the approved items listed in the LUSD Parts List. Substitutions to this list are possible but must be approved before a bid is accepted. Substitutions must be submitted to LUSD 10 working days before a bid is due and will either be approved or rejected 5 working days before a bid is due. The substitution documentation shall include the comparative specification listing for the approved product and the proposed product, including a complete listing of the characteristics of the equipment in the specification.

B. Within 10 working days after the date of the award of the contract, contractor shall submit to 3 copies of a complete submission to LUSD for review. The submission shall consist of 5 major sections, with each section separated with index tabs:

1. Section 1 shall be the Index, which will include the project title, address, name of the firm submitting the proposal and name of the architect. Each page in the submission shall be numbered chronologically and summarized in the index.

2. Section 2 shall include a copy of the contractor’s valid C-7 California State Contractor's License, documentation outlined in Section 1.02 and a list of instrumentation to be used for system testing.

3. Section 3 shall contain the pre-approved substitution submittal and the written approval from LUSD. If no substitutions are planned, it will be noted in this section as well.

4. Section 4 shall contain samples of proposed cable markers and labeling.

5. Section 5 shall contain a complete and detailed satellite cable count, workstation count, bill-of-materials and Visio drawing showing proposed work (“As Planned”). Any contractor failing to include all of the required information shall be deemed non-responsive and may be disqualified, at the discretion of LUSD.

PART 2 – PRODUCTS AND PROCEDURES

2.1 APPROVED LUSD PARTS LIST

A. An approved parts list is detailed in District Telecommunications Standards V4. Preferred education pricing provided for this list is available through Anixter Inc. (1-800-ANIXTER, reference Lodi Unified). All products must be selected from the “LUSD Parts List,” unless substitutions have been approved by LUSD.

2.2 LABELING

A. Shall follow the “LUSD Labeling Format” specified in District Telecommunications Standards V4, with the exception of workstation cables (i.e. patch cords).

B. Shall never be hand-written.

C. Shall be machine printed on clear or opaque tape, stenciled onto adhesive labels, or type written onto adhesive labels.

D. Shall have font that is at least 1/8” in height, block characters, and legible.

E. Shall have text that is of a color contrasting with the label so that it may be easily read. If labeling tape is utilized, the font color shall contrast with the background.

F. Patch panels shall exhibit workstation numbers, in a sequential order, for all workstations served by the MDF or IDF.

G. Shall be completed before testing commences. Labeling discrepancies found during inspection will void all test results.

2.3 COPPER BACKBONE CABLE

A. Description: The backbone cabling used to connect all IDF’s to the MDF, used for voice/data.

1. Shall be Category 5e and installation must be in compliance with all EIA/TIA standards.

2. The number of available wire pairs to each IDF must account for a minimum of 2 pairs per classroom. A minimum of 25 pairs of cable shall be used to any building encompassing an office. Each pathway, upon the population of cable, shall have enough wire pairs to accommodate all existing and future IDF’s in that pathway’s route.

3. Cable must be rated for the environment that it will be installed in, such as plenum, riser or outdoor rated.

4. Only Cat 5e 110 punch blocks will be allowed for terminations. Backbone pairs shall be terminated at the top left of the blocks installed in the IDF.

5. Each copper backbone cable shall be machine labeled and printed EIA/TIA 606 Section 8 compliant at each end with its respective IDF number/letter. All binder groups shall be tied off with their respective identifying ribbon at every breakout point.

2.4 WIFI CABLE

A. Description: Cabling between Wi-Fi jacks and IDF/MDF’s.

1. Shall be blue Category 6A - 802.3bt Type 4 and installation must be in compliance with all EIA/TIA standards.

2. Each blue cable shall be terminated at both ends with white Panduit Cat 6A RJ45 jacks.

3. Panduit Executive style faceplate shall be used at access point location.

4. Wireless access points shall be in every classroom, common areas, and exterior for full campus coverage.

2.5 WORKSTATION CABLE

A. Description: Cabling between workstations and IDF/MDF's.

1. Installation must be in compliance with all EIA/TIA standards.

2. Each standard classroom must have a minimum of three workstations:

a. Each workstation shall consist of 2 purple Cat 6A cables and 1 grey Cat 6A cable.
b. Workstations shall be disbursed around the room and not within 10 feet of the main door.
c. Each purple cable shall be terminated at both ends with a beige Panduit Cat 6A RJ45 jacks.
d. Each gray cable shall be terminated, with slack loop at IDF/MDF location with a Cat 6A Blue RJ45 for VOIP and 110 punch block for non-VOIP. District will identify where to use VOIP and where to non-VOIP. Workstation terminates with a Blue Panduit Cat 6A RJ45 jack for Voip and a Cat6A Black RJ45 for non-VOIP.

3. Panduit LDP series or Panduit T-70 series (both Cat 6A compliant) raceway shall be used on interior walls where raceway is required for station drops. Panduit T - 70 shall be used for computer labs and have access points every 5 feet (an access point shall consist of one duplex outlet 110 VAC receptacle and two beige Cat 6A data jacks).

4. Copper station cabling may run outside of conduits and above T-Bar suspended ceilings when available. Cables installed in this fashion must follow these guidelines:

a. Run horizontally in bundles and tie down neatly without the use of zip-ties.
b. Be well clear of any light fixtures or other electrical appliances that may affect data transmissions.
c. Have their own support system, such as J-Hooks or a cable tray.
d. Cable tray shall be a minimum of 12"x4" wire mesh and UL listed.
e. Cannot be supported by other items in the ceiling such as conduit, ducts and ceiling grids.

2.6 INTERCOM CABLE

A. Description: Cabling between Intercom Speakers/Horns and IDF/MDF's.

B. Green Cat6A cable shall be used for new IDF's/buildings.

C. Indoor Speakers:

1. Indoor speakers shall have a Green Jack at the patch panel and at designated indoor speaker locations using a Panduit executive faceplate.

2. Locations shall be 18 inches away from Access Points , 4 inches below ceiling, and 4 feet away from HVAC vents.

D. Outdoor Horns:

1. Shall have a green Jack at the patch panel and a Panduit Field Terminable RJ45 plug in a dual gang double-deep weatherproof bell box.

2. Bell boxes shall be 4 inches away from ceilings, soffits, other devices, etc. and be protected with a wire cage, allowing protected interior space of 14 (h) x 14 (w) x 16 (d) or more. Note: Outdoor horns should be used in gyms, locker rooms, multi-purpose rooms, and other noisy areas.

2.7 ACCESS CONTROL AND CAMERAS

A. Description: Cabling between cameras or access control devices and IDF/MDF's.

1. Yellow Cat6A cable shall be used with yellow jacks.

2. Access Control:

a. Shall be terminated with a yellow jack at each end of cable.

3. Cameras:

a. Camera location shall be terminated with a Panduit Field Terminable RJ45 plug in a flush mount four square box w/ a single gang mud ring or an 8x8 weather tight NEMA rated box with screw on lid.
b. Cameras should be mounted in locations shielded from the sun when possible.

2.8 PROMETHEAN BOARDS/LCD DISPLAYS

A. Description: Cabling between Promethean Boards/Displays and IDF/MDF's.

1. Purple Cat6A cable shall be used with a beige jack.

a. Beige jack shall be mounted in a Panduit Executive faceplate, located 29 inches below the ceiling, directly above the display (unless specified otherwise).
b. HDMI receptacle/faceplate shall also be mounted below the display, 14 inches above the floor, and terminate with an HDMI cable coiled behind the display.

2.9 FIBER INNERDUCT

A. Description: Ducting specifically manufactured to enclose and protect fiber optic cable.

1. Must be used for all fiber installations, with exceptions where conduits are too small to run inner duct.

2. LUSD will be notified, in writing, that conduits might be too small to run inner duct. LUSD must approve, in writing, any fiber run not in inner duct.

2.10 FIBER DISTRIBUTION

A. Description: The backbone cabling used to connect all IDF's to the MDF.

1. Only 50 um-multimode fiber (OM4) shall be used and installation must comply with all EIA/TIA standards.

2. Singlemode fiber (OS2) shall be used as needed due to distances.

3. Only 62.5/125 um-multimode fiber shall be used for fire alarm applications.

4. A minimum of 12-strand fiber shall be used from the IDF's to the MDF.

5. Each fiber cable shall homerun from the IDF's to the MDF without the use of interconnects.

6. Each pathway, upon the population of fiber, shall have enough fibers to accommodate all existing and future IDF's in that pathway route, and also be accompanied by a coax cable.

7. SC style connectors shall be used for all fiber termination.

8. All fiber strands shall be terminated and labeled at both ends with its respective IDF identifier.

9. All fiber interconnect devices shall be labeled with their respective IDF identifier.

10. At each location where the fiber cable is exposed to human intrusion, it shall be marked with warning tags. These tags shall be yellow or orange in color, and shall contain the warning: "CAUTION FIBER OPTIC CABLE." The text shall be black, block characters and at least 3/16" high. A warning tag shall be permanently affixed to each exposed cable or bundle of cables.

2.11 MAIN DISTRIBUTION FACILITY (MDF)

A. Description: A location within a building or complex of buildings, where the entire telecommunications system originates. EIA/TIA-569 standards refer to the room housing the MDF as the "Equipment Room."

1. Must be in compliance with all EIA/TIA standards.

2. Must have fire treated 3/4" plywood on all walls.

3. Must have (1) 4-post rack and (2) 2-post racks in secured dedicated rooms.

4. Cabinets must have a dedicated power outlet mounted inside.

5. Cabinet shall be load tested with no less than 200 pounds and up to rated shear strength.

6. Ladder racking must be mounted on the perimeter of all walls and above cabinets.

7. A Panduit wire manager must be mounted in-between every patch panel (must use one wire management panel for every patch panel).

8. A 3-foot slack loop shall be required at MDF for all cables.

9. MDF room sizing:

    a. High School – 15’x10’
    b. Middle School – 10’x8’
    c. Elementary School – 9’x8’

2.12 INTERMEDIATE DISTRIBUTION FACILITY (IDF)

A. Description: A location in a building that interconnects and manages the telecommunications wiring between the MDF and workstation devices.

1. Must be in compliance with all EIA/TIA standards.

2. Must have fire treated 3/4” plywood on all walls.

3. Cabinets must have a dedicated power outlet mounted inside.

4. Must have (2) lockable 90” tall, 19-inch / 40 RU, front and rear swing cabinets in unsecured locations.

5. Must have (2) 2-post racks in secured dedicated rooms.

6. Cabinet shall be load tested with no less than 200 pounds and up to rated shear strength.

7. Ladder racking must be mounted on the perimeter of all walls and above cabinets.

8. Cabinets must adhere to ADA requirements. See Enclosure G in the District’s Telecommunications Standards V4 document.

9. A Panduit wire manager must be mounted in-between every patch panel (must use one wire management panel for every patch panel).

10. A 3-foot slack loop shall be required at IDF for all cables.

2.13 BACKBOARD

A. Description: Generally, refers to the plywood sheeting lining the walls of telecommunications facilities. Backboard may also refer to the entire wall-mounted assembly including wire management, wiring blocks, and equipment cabinets.

1. Must have fire treated 3/4” plywood on all walls.

2. Dimensions shall be no larger than the cabinet/IDF when installed in a classroom.

3. Shall be fastened to two separate wall studs with 4 lag bolts.

4. Shall be no thinner than 5/8.”

2.14 GROUNDING AND BONDING

A. Description: Generally, refers to the grounding and bonding requirements for telecommunications rooms, including data cabinets, racks, and ladder racking systems. Strictly adhere to all Building Industry Consulting Service International (BICSI), Telecommunications Industry Association (TIA) recommended installation, best practices, codes, and standards when installing the grounding and telecommunications bonding infrastructure.

1. Telecommunications Main Grounding Busbar (TMGB) shall be located in the MDF: busbar placed in convenient and accessible location and bonded by means of bonding conductor for telecommunications to building service equipment (power) ground.

a. Telecommunications Main Grounding Busbar (TMGB) shall be constructed of .25” (6.4 mm) thick solid copper bar. The busbar shall be 4” (100 mm) high and 20” (510 mm) long and shall have 30 attachment points (two rows of 15 each) for two-hole grounding lugs. The hole pattern for attaching grounding lugs shall meet the requirements of ANSI-J-STD – 607-A and shall accept 27 lugs with 5/8” (15.8 mm) hole centers and 3 lugs with 1” (25.4) mm) hole centers. The busbar shall include wall-mount stand-off brackets, assembly screws and insulators creating a 4” (100 mm) standoff from the wall. The busbar shall be UL Listed as grounding and bonding equipment.

2. Telecommunications Grounding Busbar (TGB) shall be located in the IDF: interface to building telecommunications grounding system generally located in telecommunications room. Common point of connection for telecommunications system and equipment bonding to ground, and located in telecommunications room or equipment room.

a. Telecommunications Grounding Busbar (TGB) shall be constructed of .25” (6.4 mm) thick solid copper bar. The busbar shall be 2” (50 mm) high and 12” (300 mm) long and shall have 9 attachment points (one row) for two-hole grounding lugs. The hole pattern for attaching grounding lugs shall meet the requirements of ANSI-J-STD – 607-A and shall accept 6 lugs with 5/8” (15.8 mm) hole centers and 3 lugs with 1” (25.4 mm) hole centers. The busbar shall include wall-mount stand-off brackets, assembly screws and insulators

creating a 4” (100 mm) standoff from the wall. The busbar shall be UL Listed as grounding and bonding equipment.

2.15 TESTING AND DOCUMENTATION

A. Testing: Contractor shall test each fiber strand and each pair of twisted pair copper cable after labeling is 100% complete. LUSD reserves the right to have a representative present during testing.

1. Fiber Optics Cable: Each strand shall undergo bi-directional testing for signal attenuation losses.

a. Test Equipment:

1) Multi-mode: Fluke DSP 4000 for equivalent.
2) Single-mode: Laser Precision TD2000 OTDR with appropriate modules, or equivalent.

b. Tests:

1) Multi-mode: Bi-directional signal attenuation at 850 and 1300 nm.
2) Single-mode: Bi-directional signal attenuation at 1310 and 1550 nm.

c. Test Criteria:

1) Signal loss less than the link loss budget as determined by the tables below.

Multi Mode Cable

SC Connector Pair 0.5dB

Wavelength: 850 nm, Maximum Attenuation 3.5 dB/km

Wavelength: 1300 nm, Maximum Attenuation 1.5 dB/km

Example: A link with 3 connectors and a total length of 500m should have a maximum attenuation of 3.25dB at 850nm and 2.25dB at 1300nm

Single Mode Cable

SC Connector Pair 0.5dB

Wavelength: 850 nm, Maximum Attenuation 1.0 dB/km

Wavelength: 1300 nm, Maximum Attenuation 1.0 dB/km

B. Workstation Cable: Each workstation cable shall be tested from the Jack Panel to the data outlet after labeling is completed.

1. Test Equipment: Fluke DSP-4000 or equivalent.

2. Tests: Conform to EIA/TIA Standards for Category 6A.

3. Test Criteria: Tested to Category 6A for permanent link compliance.

C. Wi-Fi Cable: Each Wi-Fi cable shall be tested from the Jack Panel to the data outlet after labeling is completed.

1. Test Equipment: Fluke DSP-4000 or equivalent.

2. Tests: Conform to EIA/TIA Standards for Category 6A and 802.3bt Type 4.

3. Test Criteria: Tested to Category 6A for permanent link compliance.

D. Documentation: Contractor shall provide documentation to include test results and Visio “As-Built” drawings in both soft and hard copy format.

1. Fiber Test Results: Shall be entered onto the attached form "Fiber Test Results.”

a. Only original signed copies will be acceptable.
b. Hand written results are not acceptable.
c. Copies of test results are not acceptable.
d. Test results shall be in PDF format.

2. Workstation/Wi-Fi Test Results: Shall be provided in the form of printouts from the test equipment, as well as computer file copies on CD including the software needed to read the results.

a. Only original signed copies will be acceptable.
b. Hand written results are not acceptable.
c. Copies of test results are not acceptable.
d. Test results shall be in PDF format.

3. As-Built Drawings: Contractor shall produce drawings while adhering to the following guidelines:

a. Always use icons from the Visio stencils provided by LUSD.
b. Depiction of backbone cable routing.
c. Locations of access points, card readers, distribution cabinets, intercoms, jacks, NVRs, security cameras and workstations.

1) Active components between an end point and NVR/switch, must be documented (power injectors, switches/repeaters, hubs, etc.).
2) Access Control components must have power sources identified.
3) Jacks must be accompanied by a jack label.
4) Nodes must be accompanied by an IP address.
5) Submit before final inspection for punch list. Incorrect Visio drawings are punch list items and are to be corrected before re-inspection.
6) Additional copies corresponding to the appropriate IDF/MDF, shall be posted in the MDF’s and IDF’s.

2.16 ACCEPTANCE

A. Acceptance of the Data Communications System, by LUSD, shall be based on the results of testing, functionality, and the receipt of documentation.

1. With regard to testing, all fiber segments and workstation data cables must meet the testing criteria established in Section 2.12 above.

2. With regard to functionality, contractor must demonstrate to LUSD that Gigabit Ethernet data signals can be successfully transmitted bi-directionally, from the MDF/IDF to and from a number of individual data outlets.

    a. No more than 5% of the data jacks will be tested.

        1) If any locations fail, an additional 5% will be tested until no more links fail.

3. With regard to documentation, all required documentation shall be submitted to LUSD

PART 3 – EXECUTION

3.1 DIVISION OF WORK

A. Contractor shall design and install the data communications system as described in the preceding documentation. Installation shall result in a functional system. The scope of work shall include:

1. All necessary conduit and raceway with a Visio drawing showing proposed cable routes, existing conduit to be used, new conduit being installed, equipment racks and approximate drop location. (Note: The EIA/TIA specifies at least 2 drops per workstation location, back to the IDF/MDF).

2. Necessary trenching, backfill, replacement of landscape material, repair of damage to utilities or structures, replacement of asphalt and base, and replacement or repair to concrete work resulting from conduit or raceway installation.

3. Provide and install all equipment.

4. Test and document system upon completion. Copies of all other forms and enclosures shall be included.

5. Supply and install all necessary materials resulting in a safe, complete and functional system. The scope of work shall be reviewed by no less than 1 person for completeness from the following departments: Facilities & Planning, Maintenance & Operations.

PART 4 – CONDUIT

4.1 UNDERGROUND

A. Contractor will use PVC schedule 40 underground, with rigid 90-degree elbows and tracer tape placed 6” to 12” over the top of the PVC portions. Elbows shall have a radius of at least 10 times the diameter of the conduit used.

B. See CEC for appropriate depths and pull box sizes.

C. Should be next to existing underground where possible.

D. All new underground conduits shall be (2) 4" plus (1) 4" spare, PVC to support data/voice/intercom/PA. All new underground conduits shall be 2" PVC to support fire alarm.

E. Areas near tree roots and other underground utilities will need to be hand dug. LUSD will identify those areas. Pull boxes are to have traffic lid covers (that say Data). The bottom will be grooved with drains installed. LUSD will provide diagrams upon request.

4.2 ABOVEGROUND

A. All roof penetrations shall be approved by LUSD, before actual penetration is made.

B. All exterior conduit that is accessible shall be in rigid conduit.

C. A pull rope will be installed in all new and existing conduits used, including underground and interior conduit.

D. Firewall penetrations will extend though the wall a minimum of 12 inches.

1. Shall be sealed around the outside with fire caulk.

2. Shall be sealed around the inside with fire caulk duct seal (the depth shall be 50% diameter of the conduit).

3. No innerduct shall be installed in a firewall penetration.

E. Conduit size to be determined by EIA/TIA Standards leaving room for future expansion.

F. EMT conduit shall be used in the following interior areas:

1. Gyms

2. Multi-Purpose rooms

3. Industrial Arts buildings

G. LB's shall not be used in new and existing conduit for data applications.

H. Data/Voice conduits shall service LUSD's voice and managed IP network only.

4.3 PORTABLE CLASSROOMS

A. All conduits to be installed on the exterior of a portable will be approved by LUSD personnel before installation.

B. The center beam of a portable shall not be penetrated.

PART 5 – CONCRETE

5.1 ALL concrete and asphalt repair shall be included in the scope of work and will be replaced from joint to joint (no patching, except when done temporarily for safety).

5.2 Soft patch may not be used as a permanent patch for asphalt or concrete.

PART 6 – CHANGE ORDERS

6.1 ALL change orders shall be routed to the department originating the project. Departments are typically Facilities & Planning and Technology Services and will be approved or disapproved on a case by case basis.

6.2 Approved change order form will be added to the scope of work and completed as a part of the contract.

PART 7 – DEPARTURE AND SPECIFICATIONS

7.1 During unusual or unique situations, a departure from specifications (DFS) may be granted for specific locations and/or equipment. Approval is granted or denied in writing by Technology Services. See section 1.05 for materials substitutions.

7.2 The contractor will keep all forms on file until the warranty on the installation expires.

PART 8 – ASBESTOS AND LEAD CONTAINING PAINT WAIVER

8.1 Asbestos work must be performed by M&O approved certified remediation company. Contractor must contact LUSD's Maintenance and Operations (M&O) department for a current list of Asbestos Hazard Emergency Response Act (AHERA) sites, requiring work to be performed by a remediation company.

8.2 All District sites will be considered to be a lead containing paint facility unless the area of work has been sampled and determined to be otherwise. All work including but not limited to cutting and/or hole drilling will be performed by a lead awareness trained individual that is also trained in HW collection and disposal activities. Otherwise the contractor must employee the services of an environmental company approved by M&O and certified to perform theses duties. All environmental activity will be reported to the Maintenance & Operation Structural Supervisor at (209) 331-7193 prior to the commencement of work.

PART 9 – ACCESS CONTROL & VIDEO SAFETY

9.1 INTRODUCTION

A. In addition to LUSD Infrastructure Wiring Specifications, the following guidelines apply to access control card readers, security cameras, and other access devices installed within LUSD.

B. A site walk must also be performed with a Technology Services staff member before work begins.

9.2 JAESC/TRANSPORTATION/WAREHOUSE SPECIFIC GUIDELINES

A. Access control devices and security cameras will be:

1. Connected directly on the LUSD network.

a. Operations, VLAN 99.

2. Powered by LUSD POE switches.

B. All access control nodes should be fed from the MDF, when the run is within EIA/TIA specifications.

C. NVR will be housed in the Data Center and rack mounted.

9.3 SCHOOL SITE SPECIFIC GUIDELINES

A. Access control card readers and other access devices will be:

1. Connected directly on the LUSD network.

a. Operations, VLAN 99.

2. Powered by LUSD POE switches.

B. Security cameras will be placed on their own private network.

C. The installation location of the NVR is to be coordinated with Technology Services. Ideally, the NVR will be installed in the MDF where security and environmental conditions are monitored.

1. NVR’s are to have two NICs

a. One placed on the private network
b. The other on LUSD’s Operations network.

D. A maximum of 1 external (public network) viewing license/user, will be allowed for each site.

9.4 DISTRICT WIDE GUIDELINES

A. Network Video Recorder (NVR), GateKeeper, and other full OS devices (Windows/Mac), will have the LUSD’s Anti-Virus and LanRev agents installed on the systems. In addition, the device name and description are setup according to LUSD specifications.

B. All power supplies shall be housed in a cabinet or communications closet.

C. All cable runs shall be terminated at a jack, not a modular plug.

D. No faceplate needed in ceiling jacks and utilize yellow patch cables.

E. Contractor shall receive approval from LUSD before sharing any cabling pathways with existing LUSD infrastructure.

F. Yellow Cat 6A cable shall be used for infrastructure cabling runs, terminated into yellow Panduit jacks.

G. 19” Patch Panel required for all cabinets (both existing or new cabinets).

H. Repeaters/switches used where a 90 meter run is exceeded, are to be located 5 feet from an existing MDF/IDF.

I. All jacks shall be labeled in accordance with LUSD specifications.

J. Technology Services Network Operations Center (NOC) shall be contacted before anything is patched into LUSD’s network. The NOC will be able to verify connectivity and ensure there are no other issues.

1. NOC can be reached at: (209) 331-8911.

9.5 DOCUMENTATION GUIDELINES

A. Please see section 2.12 for cable testing and Visio drawing guidelines

9.6 POWER

A. All cabinets will have a dedicated circuit/breaker and power sources must be mounted per CEC requirements. During the initial walk with Technology Services, power sources will be identified. If power source is not available, Technology Services will work with M&O to coordinate the installation of power source. Powering cabinets with extension cords is not permissible.

B. Temporary Power

1. If active components are not operating off a dedicated power outlet/source, then it needs to be noted on the drawing with building/location. All active components mounted in a cabinet must have a dedicated power outlet within the cabinet. Do not affix raceway to walls for temporary power/extension cords.

9.7 MISCELLANEOUS

A. All wires must be labeled w/ wire-wrap style labels within 3 inches of the jacks.

B. Jacks should be labeled and tested at both ends of each smallest segment according to Specifications. This type of passive cross connect is no longer allowed.

C. As of July 1st, 2016, single gang boxes are not permitted in IDFs.

D. Jacks are now placed in a 24 port patch panel, Panduit part #CP24BLY

PART 10 – PROMETHEAN BOARDS, DISPLAYS, & A/V PROJECTORS

10.1 MOUNTING GUIDELINES

A. For new construction, DSA approved drawings on following pages must be observed by both architect and installer.

B. DSA standards must be followed.

C. Any non-standard mounts must be approved by F&P.

D. All mounts must be tagged with contractor's name and date of installation. See DSA approved mounting documentation.

E. HDMI cables mounted in raceway must be able to pass a clean digital signal, with an allowance for a standard quality user patch cable to span 35 feet.

1. For example: If the user connects a 35-foot cable to the user interface/wall plate and the length of the infrastructure cable between the wall plate and the projector is 10 feet, then the total length of digital transmission is 45 feet; therefore, the installer must demonstrate that the infrastructure cable can deliver a clear picture while being extended with a 35-foot HDMI male-to-male patch cable. Sound must also be demonstrated through jacks in faceplates.

F. User connection interface/wall plate will contain, one VGA, one HDMI, and one 1/8 stereo audio jack. Active faceplates will be used for VGA/HDMI connection.

G. User connection interface/wall plate will contain one VGA, one HDMI, and one 1/8 stereo audio jack. Active faceplates will be used for VGA connection.

H. Power will be installed high on the wall within two feet of the projector.

10.2 SHORT THROW PROJECTORS

A. Mounted to a plate/backboard that spans two studs.

B. Secured to wall studs with 4 lag bolts.

C. Head clearance from bottom of projector must be a minimum of 78 inches from floor.

D. All CAT6A network connections, AV connections, and power shall be installed behind the short throw wall mount bracket.

E. The use of short throw projectors shall be determined per project, and with District approval.

10.3 CEILING MOUNT PROJECTORS

A. For T-Bar Ceiling: Two drop ceiling T-bar rods must be attached to opposite corners of the T-bar projector mount panels.

B. For Hard Lid Ceiling: Mount must be bolted to cross-members (or ceiling joist) with no less than two bolts and some additional mounting brackets.

C. All CAT6A network connections, AV connections, and power shall be installed above the ceiling mount bracket.

D. The use of ceiling mount projectors shall be determined per project, and with District approval.

10.4 PROMETHEAN BOARDS

A. 75” wall mounted Promethean Boards shall be installed in all classrooms.

B. Promethean Boards shall have adjustable mounts when used in Kindergarten through 6th grade classrooms.

C. HMDI cabling shall be from Promethean Board to the teaching station with a CAT6A connection. An additional HMDI connections shall be installed directly below the board with a CAT6A connection.

10.5 MULTIPURPOSE ROOMS/GYMS

A. Large assembly areas shall receive electric large format projection screens and lamp less ceiling mounted projectors. Refer to current District standards for current manufacture and model number.

B. Large assembly areas shall have a dedicated AV cabinet to facilitate local presentations and house wireless microphones and AV amplifiers.

C. Large assembly areas shall have separate sound systems.

D. AV wall controls shall be based on Extron Electronics and control all AV in the space, with the capability to integrate lighting and shades.

E. Sizing of screens, throw distance of projector, and locations shall be engineered by AV Contractor and approved by the District.

10.6 DSA MOUNTING DOCUMENTATION

A. Refer to District Telecommunications standards V4 for Projector Anchor and Projector Mount details.

PART 11 – INTRUSION ALARM

11.1 SYSTEM

A. The system is based on Ademco panels, keypads, and devices.

B. No door contacts

11.2 TELCO INTERCONNECT

A. Shall be clearly identified by the CSID noted on the keypad for each COM panel.

B. Each new COM panel shall have a dedicated Measured Business Line.

C. 3-pair 66 block style biscuit-blocks are preferred at point of termination for COM panel phone lines (No RJ31X’s).

D. LUSD will only test Measured Business Line to 66 block style biscuit-block.

11.3 WIRING

A. Shall be supported by D rings, Velcro, or J hooks.

B. Pathways should not be shared with data cabling.

C. When overriding existing voice or data cables in a box or conduit, Technology Services must be contacted and give approval to do so.

PART 12 – RACK LAYOUTS, LABELING, PARTS LIST, AND INSPECTION CHECK LIST

A. Contractor shall be responsible to obtain, review and comply with all of the following diagrams, details and lists from the District. Refer to the District Telecommunications standards V4.

1. LUSD MDF Layout
2. LUSD IDF Layout
3. LUSD Double 2-Post Rack Layout
4. LUSD Previous IDF Layout
5. LUSD Labeling Format
6. JAESC Labeling Format
7. Approved LUSD Parts List
8. LUSD Basic Telecommunications Jack Legend
9. Data/Camera System Install Inspection Check List
10. Projector System Install Inspection Check List – Sample Continued
11. Accessible Requirements for Cabinet Mounting

END OF SECTION

SECTION 28 31 11

FIRE ALARM / VOICE EVACUATION SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. A new intelligent reporting, microprocessor controlled fire detection system shall be installed in accordance to the project specifications and drawings.

B. The work under this section includes all final design, all labor, material, equipment, supplies, labor, testing, and accessories required to furnish and install a complete Fire Alarm System as indicated on the drawings and as specified herein.

C. All miscellaneous system components including, but not limited to, cables, termination equipment, punch blocks, patch panels, backboards, and any other related items shall be furnished and installed complete under this section, such that the system shall perform all functions listed herein in compliance with all of the specified requirements.

D. The Fire Alarm System shall include, but not limited to, the following subsystems / products:

1. See Products Section.

E. Basic Performance:

1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 4 (Class B) Signaling Line Circuits (SLC).

2. Device Circuits (IDC) shall be wired Class B (NFPA Style D) as part of an addressable device connected by the SLC Circuit.

3. Notification Appliance Circuits (NAC) shall be wired Class A (NFPA Style Z) as part of an addressable device connected by the SLC Circuit.

4. On Style 6 or 7 (Class A) configurations a single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.

5. Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded.

6. Speaker circuits may be controlled by NAC outputs built into the amplifiers, which shall function as addressable points on the Digital Audio Loop.

7. NAC speaker circuits shall be arranged such that there is a minimum of one speaker circuit per floor of the building or smoke zone whichever is greater.

8. Audio amplifiers and tone generating equipment shall be electrically supervised for normal and abnormal conditions.

9. NAC speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.
   Two-way emergency telephone communication circuits shall be supervised for open and short circuit conditions.
   Speaker circuits shall be arranged such that there is a minimum of one speaker circuit per smoke zone.
   Speaker circuits shall be electrically supervised for open and short circuit conditions. If a short circuit exists on a speaker circuit, it shall not be possible to activate that circuit.

10. Audio amplifiers and tone generating equipment shall be electrically supervised for abnormal conditions. Digital amplifiers shall provide built-in speaker circuits, field configurable as four Class B (Style Y), or two Class A (Style Z) circuits.

11. Digital amplifiers shall be capable of storing up to two minutes of digitally recorded audio messages and tones. The digital amplifiers shall also be capable of supervising the connection to the associated digital message generator, and upon loss of that connection shall be capable of one of the following system responses:

    a. The digital amplifier shall automatically broadcast the stored audio message.
    b. The digital amplifier shall switch to a mode where a local bus input on the digital amplifier will accept an input to initiate a broadcast of the stored message. This bus input shall be connected to a NAC on a local FACP for the purpose of providing an alternate means of initiating an emergency message during a communication fault condition.
    c. Speaker circuits shall be either 25 VRMS or 70VRMS. Speaker circuits shall have 20% space capacity for future expansion or increased power output requirements.
    d. Two-way emergency telephone (Fire Fighter Telephone) communication shall be supported between the Audio Command Center and up to seven (7) remote Fire Fighter's Telephone locations simultaneously on a telephone riser.
    e. Means shall be provided to connect FFT voice communications to the speaker circuits in order to allow voice paging over the speaker circuit from a telephone handset.
    f. The digital audio message generator shall be of reliable, non-moving parts, and support the digital storage of up to 32 minutes of tones and emergency messages, shall support programming options to string audio segments together to create up to 1000 messages, or to loop messages and parts of messages to repeat for pre-determined cycles or indefinitely.

1.2 RELATED WORK

A. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and sections of Divisions 1 and 28 of these specifications.

B. All applicable portions of Section 26 00 00 shall apply to this section as though written herein completely.

1.3 GENERAL REQUIREMENTS

A. The contractor shall hold a valid State of California C-10 Low-Voltage license, shall have completed at least 20 projects of equal scope, shall have been in business of furnishing and installing systems of this scope and magnitude for at least five years, and capable of being bonded to assure the owner of performance and satisfactory service during the guarantee period.

B. The contractor shall hold all other licenses required by the legally constituted authorities having jurisdiction over the work.

C. All work shall be performed under the supervision of a company accredited by the basic equipment manufacturer and such accreditation must be presented.

D. The installing contractor shall be a factory authorized distributor and warrantee station for the brand of equipment offered and shall maintain a fully equipped service organization capable of furnishing adequate repair service to the equipment. The installing contractor shall maintain a spare set of all major parts for the system at all times. All circuit boards, amplifiers and control sub systems shall be 100% backed up with stock at contractors shop.

E. All of the equipment in this specification shall be furnished and installed by the Authorized Factory Distributor of the equipment. The Contractor shall furnish a letter from the manufacturer of all major equipment, which certifies that the installing contractor is the Authorized Distributor and that the equipment has been installed according to factory intended practices. The Contractor shall also furnish a written guarantee from the manufacturer that they will have a service representative assigned to this area for the life of the equipment.

F. The fire alarm contractor shall be UL listed company under the UL classification of (UUJS). The installation company shall UL certify this installation.

G. The fire alarm contractor shall have a NICET Certified and Technicians on staff in their facility directly involved with this project to ensure technical expertise to this project and adherence with these specifications.

H. The fire alarm contractor shall maintain sufficient stock on hand and have a fully equipped service organization capable of guaranteeing response time within 8 hours of service calls, 24 hours a day, 7 days a week to service completed systems.

I. Equipment, wire and materials shall only be installed by the fire alarm contractor / manufacture’s distributor. A Contractor other than the manufacturer’s distributor used to install the system is not acceptable.

J. The fire alarm contractor/distributor shall provide, install and test all equipment related to this section.

1.4 QUALITY ASSURANCE

A. In order to maintain a high degree of quality assurance, the contractor shall, without exception, use the parts and supplies as specified in this specification.

B. No substitution will be accepted, this is a District standard product.

C. It is the intent of these specifications to establish a standard of quality for labor and material to be installed. The Base Bid shall include materials as specified - without exception. No substitutions will be accepted.

D. All of the equipment in this specification shall be furnished and installed by the Authorized Factory Distributor of the equipment with the most current software package available at the time of installation. At the time of Owner Acceptance of the installation, all equipment shall include any and all updated software revisions. In addition, when the software is available in disk format, a backup copy of the most up to date revision, in disk format, shall be handed to the Owner at the completion of the project.

E. Conform to all of the applicable provisions of the following standards.

1. NFPA 72 – National Fire Alarm Code with California Amendments

2. CBC – California Building Code

3. CEC – California Electrical Code

4. CFC – California Fire Code

5. Local and State Building Codes.

6. All requirements of the Authority Having Jurisdiction (AHJ).

1.5 SUBMITTAL AND MANUAL

A. Comply with all requirements of the General Conditions, Supplementary Conditions and applicable sections of Divisions 1 and 16 of these specifications.

B. Additional requirements of this section are:

1. Within thirty-five (35) calendar days after the date of award of the Contract, the Contractor shall submit eight copies of the complete submission to the Architect for review.

2. The submission shall consist of five major sections with each section separated with index tabs. Each page in the submission shall be numbered chronologically and shall be summarized in the index.

3. The first section shall be the "index" which shall include the project title and address, name of the firm submitting the proposal and name of the Architect.

4. The second section shall include the following items:

a. Contractor's License: A copy of the electronics contractor's valid State of California License.
b. Proof of Experience: Proof that the fire alarm contractor has been regularly engaged in the business of fire alarm contracting consisting of, but not limited to, engineering, fabrication, installation, and servicing of fire alarm systems of the type specified herein for at least the past ten (10) consecutive years. Provide a statement summarizing any pending litigation involving any officer

or principal of/or the company, the nature of the litigation and what effect the litigation may carry as it relates to this work in the worst case scenario. Non-disclosure of this item, if later discovered, may result, at the owner's discretion, in the contractor bearing all costs and any cost related to associated delays in the progress of the work.

c. Insurance Certificates: Copy of fire alarm contractor's current liability insurance and state industrial insurance certificates in conformance with the contract documents.
d. Project List: A List containing at least ten (10) California installations completed within the last five (5) years by the fire alarm contractor that are comparable in scope and nature to that specified in the contract document.
e. Service Capability: Documentation indicating in detail that the fire alarm contractor has competent engineering, installation, service personnel and facilities with reasonable stock of service parts within 100 air miles of the job site.
f. Authorization Letters: Letters from the fire alarm equipment manufacturer stating that the fire alarm contractor is the Factory Authorized Distributor, and is trained and certified for the equipment he proposes to use on this project, and is licensed to purchase and install that software required to provide the specified functions.
g. Certification:

    1) Proof that the fire alarm contractor is Underwriters Laboratories, Inc. (UL) listed under the classification of "PROTECTIVE SIGNALING SERVICES-LOCAL, AUXILIARY, REMOTE STATION AND PROPRIETARY (UUJS).
    2) Copy of the following: (NICET) Certificates. Provide proof that the certificate holders are a part of the fire alarm contractor's local facility servicing this project and will be actively involved in this project.

        a) Technician Level 2 minimum of (5).
        b) Technician Level 4 minimum of (1)

h. Proof of Trained Personnel:

    1) Documentation that the fire alarm contractor has on staff personnel factory-trained and certified for the equipment proposed for this project. Also, provide a statement that personnel meeting these qualifications are in the local facility, and will be maintained at that facility throughout the project and the warranty period.

5. The third section shall contain the comparative specification listing, including a complete listing of the characteristics of the equipment to be furnished next to all of the specified equipment's features and functions as stated in the specifications and data sheets. Include CSFM listing sheet for each component.

6. The fourth section shall contain an original factory data sheet for every component in the specifications.

7. The fifth section shall contain a designation schedule for each Structured Cabling System location and complete 1/8" = 1'-0" scale drawing showing system wiring plans.

a. Riser Diagram.
b. Typical Device Wiring Diagram.
c. Wire Legend, including types for zones and devices and color coding to be utilized.
d. Battery Calculation for each control panel, power supply, field power supply and network annunciator.
e. Worst Case Voltage drop for each circuit type per building.
f. Floor Plans showing all conduits, sizes, quantity of conductors.
g. Mounting Height of each devices and back box requirement.
h. Zoning and address description legend.

C. Failure to comply with all of the requirements listed above will result in the rejection of the entire submittal package.

D. The Contractor shall provide two copies of an "Operating and Servicing Manual" for the system. The manuals shall be bound in flexible binders. All data shall be printed material or typewritten. Each manual shall include the following: Instructions necessary for the proper operation and servicing of the system; complete as-built installation drawings of the system; a wiring destination schedule for each circuit leaving for each piece of equipment; a schematic diagram of major components with all transistor and IC complements and replacement number.

1.6 GENERAL SYSTEM PRODUCT, INSTALLATION AND OVERALL SYSTEM WARRANTY

A. Prior to Owner acceptance, the contractor shall provide to Owner, a manufacturers product and performance warranty. This will require a submittal of the required pre-job certification registration forms as well as the required project closing information. The Owner will only acknowledge acceptance upon submittal of a valid manufacturer’s warranty.

B. The warranty shall commence from the date of final written acceptance by the Owner.

C. All conditions for obtaining the manufacturers warranty shall be the sole responsibility of the contractor.

D. The contractor shall maintain a competent service organization and shall, if requested, submit a service maintenance agreement to the owner after the end of the guarantee period.

E. A typewritten notice shall be posted at the equipment rack that shall indicate the firm, address and telephone number to call when service is necessary. The notice shall be mounted in a neatly finished metal frame with a clear plastic window and securely attached to the inside of the door.

1.7 SPECIFIC SYSTEM PRODUCT, INSTALLATION AND OVERALL SYSTEM WARRANTY

A. The entire system shall be warranted free of mechanical or electrical defects for a period of one (1) year after final acceptance of the installation. Any material showing mechanical or electrical defects shall be replaced promptly at no expense to the Owner.

1.8 DESCRIPTION

A. The fire alarm system shall comply with requirements of NFPA Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.

B. The facility shall have an emergency voice alarm communication system. Digitally stored message sequences shall notify the building occupants that a fire or life safety condition has been reported. Message generator(s) shall be capable of automatically distributing up to eight (8) simultaneous, unique messages to appropriate audio zones within the facility based on the type and location of the initiating event. The Fire Command Center (FCC) shall also support Emergency manual voice announcement capability for both system wide or selected audio zones, and shall include provisions for the system operator to override automatic messages system wide or in selected zones.

C. The system shall be support additional, alternate Fire Command Centers, which shall be capable of simultaneous monitoring of all system events. Alternate Fire Command Centers shall also support an approved method of transferring the control functions to an alternate Fire Command Center when necessary. All Fire Command Centers shall be individually capable of assuming Audio Command functions such as Emergency Paging, audio zone control functions, and Firefighter's Telephone communication functions.

D. Each designated zone shall transmit separate and different alarm, supervisory and trouble signals to the Fire Command Center (FCC) and designated personnel in other buildings at the site via a multiplex communication network.

E. The fire alarm system shall be manufactured by an ISO 9001:2008 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994

F. The FACP and peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof). It’s acceptable for peripheral devices to be manufactured outside of the U.S. by a division of the U.S. based parent company.

G. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.

H. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final checkout and to ensure the systems integrity.

1.9 POST CONTRACT MAINTENANCE:

A. Complete maintenance and repair service for the fire and gas detection system shall be available from a factory trained authorized representative of the manufacturer of the major equipment for a period of five (5) years after expiration of the guaranty.

B. As part of the bid/proposal, include a quote for a maintenance contract to provide all maintenance, required tests, and list pricing for any replacement products included on the bill of materials, along with the list pricing for products not on the bill of materials; if test and inspection rates are different than full service rates the bid/proposal shall include pricing for all levels for a minimum period of five (5) years Rates and costs shall be valid for the period of five (5) years after expiration of the guaranty.

C. Include also a quote for unscheduled maintenance/repairs, including hourly rates for technicians trained on this equipment, and response travel costs for each year of the maintenance period. Submittals that do not identify all post contract maintenance costs will not be accepted. Rates and costs shall be valid for the period of five (5) years after expiration of the guaranty.

D. As part of the submittal, include a quotation for all parts and material, and all installation and test labor as needed to increase the number of intelligent or addressable devices by ten percent (10%). This quotation shall include intelligent smoke detectors, intelligent heat detectors, addressable manual stations, addressable monitor modules and addressable modules equal in number to one tenth of the number required to meet this specification (list actual quantity of each type).

E. The quotation shall include installation, test labor, and labor to reprogram the system for this 10% expansion. If additional FACP hardware is required, include the material and labor necessary to install this hardware.

F. Do not include cost of conduit or wire or the cost to install conduit or wire except for labor to make final connections at the FACP and at each intelligent addressable device. Do not include the cost of conventional peripherals or the cost of initiating devices or notification appliances connected to the addressable monitor/control modules.

G. Submittals that do not include this estimate of post contract expansion cost will not be accepted.

PART 2.0 PRODUCTS

2.1 MAIN FIRE ALARM CONTROL PANEL OR NETWORK NODE:

A. Existing Main FACP or network node is by GAMEWELL-FCI and contains a microprocessor based Central Processing Unit (CPU) and power supply. The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system controlled devices. New devices shall be compatible with existing fire alarm system on campus.

B. In conjunction with intelligent Loop Control Modules and Loop Expander Modules, the main FACP shall perform the following functions:

1. Supervise and monitor all intelligent addressable detectors and monitor modules connected to the system for normal, trouble and alarm conditions.

2. Supervise all initiating signaling and notification circuits throughout the facility by way of connection to addressable monitor and control modules.

3. Detect the activation of any initiating device and the location of the alarm condition. Operate all notification appliances and auxiliary devices as programmed. In the event of CPU failure, all SLC loop modules shall fallback to degrade mode. Such degrade mode shall treat the corresponding SLC loop control modules and associated detection devices as conventional two-wire operation. Any activation of a detector in this mode shall automatically activate associated Notification Appliance Circuits.

2.2 SYSTEM CAPACITY AND GENERAL OPERATION

A. The FACP shall be capable of communicating on a Local Area Network (LAN) or Wide Area Network (WAN) utilizing a peer-to-peer, inherently regenerative communication format and protocol. The network shall support communication speed up to 100 Mb and support up to 200 panels / nodes per network.

B. The control panel shall be capable of expansion via up to 10 SLC loops. Each module shall support up to 318 analog/addressable devices for a maximum system capacity of 3180 points. The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel that shall include a backlit 640-character liquid crystal display, individual, color coded system status LEDs, and a keypad for the control of the fire alarm system. Said LCD shall also support graphic bit maps.

C. All programming or editing of the existing program in the system shall be achieved without interrupting the alarm monitoring functions of the fire alarm control panel.

D. The FACP shall be able to provide the following software and hardware features:

1. Pre-signal and Positive Alarm Sequence: The system shall provide means to cause alarm signals to only sound in specific areas with a delay of the alarm from 60 to up to 180 seconds after start of alarm processing. In addition, a Positive Alarm Sequence selection shall be available that allows a 15-second time period for acknowledging an alarm signal from a fire detection/initiating device. If the alarm is not acknowledged within 15 seconds, all local and remote outputs shall automatically activate immediately.

2. Smoke Detector Pre-alarm Indication at Control Panel: To obtain early warning of incipient or potential fire conditions, the system shall support a programmable option to determine system response to real-time detector sensing values above the programmed setting. Two levels of Pre-alarm indication shall be available at the control panel: alert and action.

3. Alert: It shall be possible to set individual smoke detectors for pre-programmed pre-alarm thresholds. If the individual threshold is reached, the pre-alarm condition shall be activated.

4. Action: If programmed for Action and the detector reaches a level exceeding the pre-programmed level, the control panel shall indicate an action condition. Sounder bases installed with either heat or smoke detectors shall automatically activate on action Pre-Alarm level, with general evacuation on Alarm level.

5. The system shall support a detector response time to meet world annunciation requirements of less than 3 seconds.

6. Device Blink Control: Means shall be provided to turn off detector/module LED strobes for special areas.

7. NFPA 72 Smoke Detector Sensitivity Test: The system shall provide an automatic smoke detector test function that meets the sensitivity testing requirements of NFPA 72.

8. Programmable Trouble Reminder: The system shall provide means to automatically initiate a reminder that troubles exist in the system. The remainder will appear on the system display and (if enabled) will sound a piezo alarm.

9. On-line or Off-line programming: The system shall provide means to allow panel programming either through an off-line software utility program away from the panel or while connected and on-line. The system shall also support upload and download of programmed database and panel executive system program to a Personal Computer/laptop. A single change to one CPU database shall not require a database download to other CPUs.

10. History Events: The panel shall maintain a history file of the last 4000 events, each with a time and date stamp. History events shall include all alarms, troubles, operator actions, and programming entries. The control panels shall also maintain a 1000 event Alarm History buffer, which consists of the 1000 most recent alarm events from the 4000 event history file.

11. Smoke Control Modes: The system shall provide means to perform FSCS mode Smoke Control to meet NFPA-92A and 90B and HVAC mode to meet NFPA 90A.

12. The system shall provide means for all SLC devices on any SLC loop to be auto programmed into the system by specific address. The system shall recognize specific device type ID's and associate that ID with the corresponding address of the device.

13. Passwords and Users: The system shall support two password levels, master and user. Up to 9 user passwords shall be available, each of which may be assigned access to the programming change menus, the alter status menus, or both. Only the master password shall allow access to password change screens.

14. Block Acknowledge: The system shall support a block Acknowledge for Trouble Conditions

15. Sensitivity Adjust: The system shall provide Automatic Detector Sensitivity Adjust based on Occupancy schedules including a Holiday list of up to 15 days.

16. Environmental Drift Control: The system shall provide means for setting Environmental Drift Compensation by device. When a detector accumulates dust in the chamber and reaches an unacceptable level but yet still below the allowed limit, the control panel shall indicate a maintenance alert warning. When the detector accumulates dust in the chamber above the allowed limit, the control panel shall indicate a maintenance urgent warning.

17. Custom Action Messages: The system shall provide means to enter up to 100 custom action messages of up to 160 characters each. It shall be possible to assign any of the 100 messages to any point.

18. Local Mode: If communication is lost to the central processor the system shall provide added survivability through the intelligent loop control modules. Inputs from devices connected to the SLC and loop control modules shall activate outputs on the same loop when the inputs and outputs have been set with point programming to participate in local mode or when the type codes are of the same

type: that is, an input with a fire alarm type code shall activate an output with a fire alarm type code.

19. Read status preview - enabled and disabled points: Prior to re-enabling points, the system shall inform the user that a disabled device is in the alarm state. This shall provide notice that the device must be reset before the device is enabled thereby avoiding activation of the notification circuits.

20. Custom Graphics: When fitted with an LCD display, the panel shall permit uploading of a custom bit-mapped graphic to the display screen.

21. Multi-Detector and Cooperating Detectors: The system shall provide means to link one detector with up to two detectors at other addresses on the same loop in cooperative multi-detector sensing. There shall be no requirement for sequential addresses on the detectors and the alarm event shall be a result of all cooperating detectors chamber readings.

22. ACTIVE EVENT: The system shall provide a Type ID called FIRE CONTROL for purposes of air-handling shutdown, which shall be intended to override normal operating automatic functions. Activation of a FIRE CONTROL point shall cause the control panel to (1) initiate the monitor module Control-by-Event, (2) send a message to the panel display, history buffer, installed printer and annunciators, (3) shall not light an indicator at the control panel, (4) Shall display ACTIVE on the LCD as well a display a FIRE CONTROL Type Code and other information specific to the device.

23. NON-FIRE Alarm Module Reporting: A point with a type ID of NON-FIRE shall be available for use for energy management or other non-fire situations. NON-FIRE point operation shall not affect control panel operation nor shall it display a message at the panel LDC. Activation of a NON-FIRE point shall activate control by event logic but shall not cause any indication on the control panel.

24. Mass Notification Override: The system shall be UL 2572 listed for Mass Notification and shall be capable, based on the Risk Analysis, of being programmed so that Mass Notification/Emergency Communications events take precedence over fire alarm events.

25. Security Monitor Points: The system shall provide means to monitor any point as a type security.

26. One-Man Walk Test: The system shall provide both a basic and advanced walk test for testing the entire fire alarm system. The basic walk test shall allow a single operator to run audible tests on the panel. All logic equation automation shall be suspended during the test and while annunciators can be enabled for the test, all shall default to the disabled state. During an advanced walk test, field-supplied output point programming will react to input stimuli such as CBE and logic equations. When points are activated in advanced test mode, each initiating event shall latch the input. The advanced test shall be audible and shall be used for pull station verification, magnet activated tests on input devices, input and output device and wiring operation/verification.

27. Control By Event Functions: CBE software functions shall provide means to program a variety of output responses based on various initiating events. The control panel shall operate CBE through lists of zones. A zone shall become listed when it is added to a point's zone map through point programming. Each input point such as detector, monitor module or panel circuit module shall support listing of up to 10 zones into its programmed zone map.

28. Permitted zone types shall be general zone, releasing zone and special zone. Each output point (control module, panel circuit module) can support a list of up to 10 zones including general zone, logic zone, releasing zone and trouble zone. It shall be possible for output points to be assigned to list general alarm. Non-Alarm or Supervisory points shall not activate the general alarm zone.

29. 1000 General Zones: The system shall support up to 1000 general purpose software zones for linking inputs to outputs. When an input device activates, any general zone programmed into that device's zone map will be active and any output device that has an active general zone in its map will be active. It shall also be possible to use general zone as arguments in logic equations.

30. 1000 Logic Equations: The system shall support up to 1000 logic equations for AND, OR, NOT, ONLY1, ANYX, XZONE or RANGE operators that allow conditional I/O linking. When any logic equation becomes true, all output points mapped to the logic zone shall activate.

31. 100 trouble equations per device: The system shall provide support for up to 100 trouble equations for each device, which shall permit programming parameters to be altered, based on specific fault conditions. If the trouble equation becomes true, all output points mapped to the trouble zone shall activate.

32. Control-By-Time: A time based logic function shall be available to delay an action for a specific period of time based upon a logic input with tracking feature. A latched version shall also be available. Another version of this shall permit activation on specific days of the week or year with ability to set and restore based on a 24 hour time schedule on any day of the week or year.

33. Multiple agent releasing zones: The system shall support up to 10 releasing zones to protect against 10 independent hazards. Releasing zones shall provide up to three cross-zone and four abort options to satisfy any local jurisdiction requirements.

34. Alarm Verification, by device, with timer and tally: The system shall provide a user-defined global software timer function that can be set for a specific detector. The timer function shall delay an alarm signal for a user-specified time period and the control panel shall ignore the alarm verification timer if another alarm is detected during the verification period. It shall also be possible to set a maximum verification count between 0 and 20 with the "0" setting producing no alarm verification. When the counter exceeds the threshold value entered, a trouble shall be generated to the panel.

E. Network Communication

1. The FACP shall be capable of communicating over a Local Area Network (LAN) or Wide Area Network (WAN) utilizing a peer-to-peer, inherently regenerative communication format and protocol. The network shall support communication speed up to 100 Mb and support up to 200 panels/nodes per network.

F. FACP Central Processing Unit

1. The Central Processing Unit shall contain and execute all control-by-event (including Boolean functions including but not limited to AND, OR, NOT, ANYx, and CROSSZONE) programs for specific action to be taken if an alarm condition is detected by the system. Such control-by-event programs shall be held in non-volatile programmable memory, and shall not be lost with system primary and secondary power failure.

2. The Central Processing Unit shall also provide a real-time clock for time annotation, to the second, of all system events. The time-of-day and date shall not be lost if system primary and secondary power supplies fail.

3. The CPU shall be capable of being programmed on site without requiring the use of any external programming equipment. Systems that require the use of external programmers or change of EPROMs are not acceptable.

4. The CPU shall provide an EIA-232 interface between the fire alarm control panel and the UL Listed Electronic Data Processing (EDP) peripherals.

5. The CPU shall provide two EIA-485 ports for the serial connection to annunciation and control subsystem components.

6. The EIA-232 serial output circuit shall be optically isolated to assure protection from earth ground.

G. Display

1. The system display shall provide a 640-character backlit alphanumeric Liquid Crystal Display (LCD). It shall also provide eleven Light-Emitting-Diodes (LEDs) that indicate the status of the following system parameters: AC POWER, FIRE ALARM, PREALARM, SECURITY, SUPERVISORY, SYSTEM TROUBLE, OTHER EVENT, SIGNALS SILENCED, POINT DISABLED, CONTROLS ACTIVE, and CPU FAILURE.

2. The system display shall provide a QWERTY style keypad with control capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels with up to ten (one Master and nine User) passwords shall be accessible through the display interface assembly to prevent unauthorized system control or programming.

H. Loop (Signaling Line Circuit) Control Module:

1. The Loop Control Module shall monitor and control a minimum of 318254318 intelligent addressable devices. This includes 159 159127 intelligent detectors (Ionization, Photoelectric, or Thermal) and 159127159monitor or control modules.

2. The Loop Control Module shall contain its own microprocessor and shall be capable of operating in a local/degrade mode (any addressable device input shall be capable of activating any or all addressable device outputs) in the unlikely event of a failure in the main CPU.

3. Each Loop shall be capable of operating as a NFPA Style 4 (Class B) circuit. Fault isolation modules shall be installed between each addressable SLC device per the manufacturers installation instructions. Systems which cannot provide full loop loading in Style 7 configurations are not acceptable.

4. The SLC interface board shall receive analog or digital information from all intelligent detectors and shall process this information to determine whether normal, alarm, or trouble conditions exist for that particular device. Each SLC Loop shall be isolated and equipped to annunciate an Earth Fault condition. The SLC interface board software shall include software to automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information may also be used for automatic detector testing and the automatic determination of detector maintenance requirements.

I. Digital Voice Command Center

1. The Digital Voice Command Center located with the FACP, shall contain all equipment required for all audio control, emergency telephone system control, signaling and supervisory functions. This shall include speaker zone indication and control, telephone circuit indication and control, digital voice units, microphone and main telephone handset.

2. Function: The Voice Command Center equipment shall perform the following functions:

   a. Operate as a supervised multi-channel emergency voice communication system.
      Operate as a two-way emergency telephone system control center.
   b. Audibly and visually annunciate the active or trouble condition of every speaker circuit and emergency telephone circuit.
   c. Audibly and visually annunciate any trouble condition for digital tone and voice units required for normal operation of the system.
   d. Provide all-call Emergency Paging activities through activation of a single control switch.
   e. As required, provide vectored paging control to specific audio zones via dedicated control switches.
   f. Provide a factory recorded "library" of voice messages and tones in standard WAV. File format, which may be edited and saved on a PC running a current Windows® operating system.
   g. Provide a software utility capable of off-line programming for the DVC operation and the audio message files. This utility shall support the creation of new programs as well as editing and saving existing program files. Uploading or downloading the DVC shall not inhibit the emergency operation of other nodes on the fire alarm network.
   h. Support an optional mode of operation with four analog audio outputs capable of being used with UL 864 fire-listed analog audio amplifiers and SLC

controlled switching.

i. The Digital Voice Command shall be modular in construction, and shall be capable of being field programmable without requiring the return of any components to the manufacturer and without requiring use of any external computers or other programming equipment.

j. The Digital Voice Command and associated equipment shall be protected against unusually high voltage surges or line transients.

J. Power Supply:

1. The Main Power Supply shall operate on 120/240 VAC, 50/60 Hz, and shall provide all necessary power for the FACP.

2. The Main Power Supply shall provide the required power to the CPU using a switching 24 VDC regulator and shall incorporate a battery charger for 24 hours of standby power using dual-rate charging techniques for fast battery recharge.

3. The Main Power Supply shall provide a battery charger for 24 hours of standby using dual-rate charging techniques for fast battery recharge. The supply shall be capable of charging batteries ranging in capacity from 7-200 amp-hours within a 48-hour period.

4. The Main Power Supply shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults.

5. The Main Power Supply shall be power-limited per UL864 requirements.

6. The Main Power Supply shall communicate power supply, line voltage, battery status and charger status to the local LCD display. Any abnormal condition shall be annunciated and logged to the system alarm history log.

7. Addressable Charger Power Supply: The auxiliary addressable power supply is a remote 24 VDC power supply used to power Notification Devices and field devices that require regulated 24 VDC power.

8. The addressable power supply for the fire and gas detection system shall provide up to a minimum of 6.0 amps of 24 volt DC regulated power for Notification Appliance Circuit (NAC) power or 10.0 amps of 24 volt DC general power. The power supply shall have an additional 0.5 amp of 24 VDC auxiliary power for use within the same cabinet as the power supply. It shall include an integral charger designed to charge 12 - 200 amp hour batteries.

9. The addressable power supply shall provide four individually addressable Notification Appliance Circuits that may be configured as Class "A" or Class "B" circuits. All circuits shall be power-limited per UL 864 requirements.

10. The addressable power supply shall provide built-in synchronization for certain Notification Appliances on each circuit without the need for additional synchronization modules. The power supply's output circuits shall be individually selected for synchronization. A single addressable power supply shall be capable of supporting both synchronized and non-synchronized Notification Devices at the same time.

11. The addressable power supply shall operate on 120 or 240 VAC, 50/60 Hz.

12. The interface to the power supply from the Fire Alarm Control Panel (FACP) shall be via the Signaling Line Circuit (SLC) or other multiplexed means Power supplies that do not use an intelligent interface are not suitable substitutes. The required wiring from the FACP to the addressable power supply shall be a single unshielded twisted pair wire.

13. The addressable power supply shall supervise for battery charging failure, AC power loss, power brownout, battery failure, NAC loss, and optional ground fault detection. In the event of a trouble condition, the addressable power supply shall report the incident and the applicable address to the FACP via the SLC.

14. The addressable power supply shall have an AC Power Loss Delay option. If this option is utilized and the addressable power supply experiences an AC power loss, reporting of the incident to the FACP will be delayed. A delay time of zero, two, eight or sixteen hours shall be programmable.

15. The addressable power supply shall have an option for Canadian Trouble Reporting and this option shall be programmable.

16. The addressable power supply mounts in either the FACP backbox or its own dedicated surface mounted backbox with cover.

17. Each of the power supply's four output circuits shall be programmed- for Notification Appliance Circuit or General Purpose 24 VDC power. Any output circuit shall be able to provide up to 2.5 amps of 24 VDC power.

18. The addressable power supply's output circuits shall be individually supervised when they are selected to be either a Notification Appliance Circuit when wired Class "A" or by the use of and end-of-line resistor. When the power supply's output circuit is selected as General 24 VDC power, the circuit shall be individually supervised when an end-of-line relay is used.

19. When selected for Notification Appliance Circuits, the output circuits shall be individually programmable for Steady, March Time, Dual Stage or Temporal.

20. When selected as a Notification Appliance Circuit, the output circuits of the addressable power supply shall have the option to be coded by the use of a universal zone coder.

21. The addressable power supply shall interface and synchronize with other power supplies of the same type. The required wiring to interface multiple addressable power supplies shall be a single unshielded, twisted pair wire.

22. An individual or multiple interfaced addressable power supplies shall have the option to use an external charger for battery charging. Interfaced power supplies shall have the option to share backup battery power.

K. Audio Amplifiers

1. The Audio Amplifiers will provide Audio Power (@25 Volts RMS@70 Volts RMS) for distribution to speaker circuits.

2. Multiple audio amplifiers may be mounted in a single enclosure, either to supply incremental audio power, or to function as an automatically switched backup amplifier(s).

3. The audio amplifier shall include an integral power supply, and shall provide built-in LED indicators for the following conditions:

    a. Earth Fault on DAP A (Digital Audio Port A)
    b. Earth Fault on DAP B (Digital Audio Port B)
    c. Audio Amplifier Failure Detected Trouble
    d. Active Alarm Bus input
    e. Audio Detected on Aux Input A
    f. Audio Detected on Aux Input B
    g. Audio Detected on Firefighter's Telephone Riser
    h. Receiving Audio from digital audio riser
    i. Short circuit on speaker circuit 1
    j. Short circuit on speaker circuit 2
    k. Short circuit on speaker circuit 3
    l. Short circuit on speaker circuit 4
    m. Data Transmitted on DAP A
    n. Data Received on DAP A
    o. Data Transmitted on DAP B
    p. Data Received on DAP B
    q. Board failure
    r. Active fiber optic media connection on port A (fiber optic media applications)
    s. Active fiber optic media connection on port B (fiber optic media applications)
    t. Power supply Earth Fault
    u. Power supply 5V present
    v. Power supply conditions - Brownout, High Battery, Low Battery, Charger Trouble

4. The audio amplifier shall provide the following built-in controls:

    a. Amplifier Address Selection Switches
    b. Signal Silence of communication loss annunciation Reset
    c. Level adjustment for background music
    d. Enable/Disable for Earth Fault detection on DAP A
    e. Enable/Disable for Earth Fault detection on DAP A
    f. Switch for 2-wire/4-wire FFT riser

5. Adjustment of the correct audio level for the amplifier shall not require any special tools or test equipment.

6. Includes audio input and amplified output supervision, back up input, and automatic switch over function, (if primary amplifier should fail).

7. System shall be capable of backing up digital amplifiers.

8. One-to-one backup shall be provided by either a plug-in amplifier card or a designated backup amplifier of identical model as the primary amplifier.

9. One designated backup amplifier shall be capable of backing up multiple primary amplifiers mounted in the same or adjacent cabinets.

10. Multi-channel operation from a single amplifier shall be supported by the addition of an optional plug-in amplifier card.

L. Audio Message Generator (Prerecorded Voice)/Speaker Control:

1. Each initiating zone or intelligent device shall interface with an emergency voice communication system capable of transmitting a prerecorded voice message to all speakers in the building.

2. Actuation of any alarm initiating device shall cause a prerecorded message to sound over the speakers. The message shall be repeated four (4) times. Pre- and post-message tones shall be supported.

3. A built-in microphone shall be provided to allow paging through speaker circuits.

4. System paging from emergency telephone circuits shall be supported.

5. The audio message generator shall have the following indicators and controls to allow for proper operator understanding and control:

   a. Lamp Test
   b. Trouble
   c. Off-Line Trouble
   d. Microphone Trouble
   e. Phone Trouble
   f. Busy/Wait
   g. Page Inhibited
   h. Pre/Post Announcement Tone

M. Controls with associated LED Indicators:

1. Speaker Switches/Indicators

   a. The speaker circuit control switches/indicators shall include visual indication of active and trouble status for each speaker circuit in the system.
   b. The speaker circuit control panel shall include switches to manually activate or deactivate each speaker circuit in the system.\

2. Emergency Two-Way Telephone Control Switches/Indicators

   a. The emergency telephone circuit control panel shall include visual indication of active and trouble status for each telephone circuit in the system.
   b. The telephone circuit control panel shall include switches to manually activate or deactivate each telephone circuit in the system.

N. Remote Transmissions:

1. Provide local energy or polarity reversal or trip circuits as required.

2. The system shall be capable of operating a polarity reversal or local energy or fire alarm transmitter for automatically transmitting fire information to the fire department.

3. Provide capability and equipment for transmission of zone alarm and trouble signals to remote operator's terminals, system printers and annunciators.

4. Transmitters shall be compatible with the systems and equipment they are connected to such as timing, operation and other required features.

O. Field Programming

1. The system shall be programmable, configurable and expandable in the field without the need for special tools, laptop computers, or other electronic interface equipment. There shall be no firmware changes required to field modify the system time, point information, equations, or annunciator programming/information.

2. It shall be possible to program through the standard FACP keyboard all system functions.

3. All field defined programs shall be stored in non-volatile memory. Two levels of password protection shall be provided in addition to a key-lock cabinet. One level shall be used for status level changes such as point/zone disable or manual on/off commands (Building Manager). A second (higher-level) shall be used for actual change of the life safety program (installer). These passwords shall be five (5) digits at a minimum. Upon entry of an invalid password for the third time within a one minute time period an encrypted number shall be displayed. This number can be used as a reference for determining a forgotten password.

4. The system programming shall be "backed" up via an upload/download program and stored on compatible removable media. A system back-up disk shall be completed and given in duplicate to the building owner and/or operator upon completion of the final inspection. The program that performs this function shall be "non-proprietary", in that, it shall be possible to forward it to the building owner/operator upon his or her request.

5. The installer's field programming and hardware shall be functionally tested on a computer against known parameters/norms which are established by the FACP manufacturer. A software program shall test Input-to-Output correlations, device Type ID associations, point associations, time equations, etc. This test shall be performed on an IBM-compatible PC with a verification software package. A report shall be generated of the test results and two copies turned in to the engineer(s) on record.

P. Specific System Operations

1. Smoke Detector Sensitivity Adjust: A means shall be provided for adjusting the sensitivity of any or all addressable intelligent detectors in the system from the system keypad. Sensitivity range shall be within the allowed UL window and have a minimum of 9 levels.

2. Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently selected and enabled to be an alarm verified detector. The alarm verification delay shall be programmable from 0 to 60 seconds and each detector shall be able to be selected for verification. The FACP shall keep a count of the number of times that each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.

Q. System Point Operations:

1. Any addressable device in the system shall have the capability to be enabled or disabled through the system keypad or video terminal.

2. System output points shall be capable of being turned on or off from the system keypad or the video terminal.

3. Point Read: The system shall be able to display the following point status diagnostic functions without the need for peripheral equipment. Each point shall be annunciated for the parameters listed:

   a. Device Status.
   b. Device Type.
   c. Custom Device Label.
   d. Software Zone Label.
   e. Device Zone Assignements.
   f. Analog Detector Sensitivity.
   g. All Program Parameters.

4. System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 4000 system events. Each of these events will be stored, with time and date stamp, until an operator requests that the contents be either displayed or printed. The contents of the history buffer may be manually reviewed; one event at a time, and the actual number of activations may also be displayed and or printed. History events shall include all alarms, troubles, operator actions, and programming entries.

5. The history buffer shall use non-volatile memory. Systems which use volatile memory for history storage are not acceptable.

6. Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent system detector and shall analyze the detector responses over a period of time.

7. If any intelligent detector in the system responds with a reading that is below or above normal limits, then the system will enter the trouble mode, and the particular Intelligent Detector will be annunciated on the system display, and printed on the optional system printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.

8. The system shall include the ability (programmable) to indicate a "pre-alarm" condition. This will be used to alert maintenance personal when a detector is at

80% of its alarm threshold in a 60 second period.

2.3 SYSTEM COMPONENTS:

A. Conventional Aspirating Detection

1. An optional air aspiration detection system shall be available.

2. The aspirating system shall support multiple sensitivity settings.

3. The aspirating system shall operate from 24 VDC.

4. The aspirating system shall provide alarm and trouble relays used to activate a fire alarm control panel.

B. Aspiration System Interface:

1. The system shall be capable of supporting Interface Modules for integrating Vesda Aspiration detectors into SLC loop of the fire alarm control panel. The Interface Module shall support up to 19 detectors, each SLC loop shall support one interface module.

C. High Level Aspiration System Interface:

1. The system shall be capable of supporting a High Level Interface for Vesda Aspirating Detection Systems. The interface shall support up to 100 detectors and allow the fire alarm network to monitor and control events on the aspiration system.

D. Portable Emergency Telephone Handset Jack

1. Portable emergency telephone handset jacks shall be flush mounted on stainless steel plates as indicated on plans. Handset jacks shall be approved for emergency telephone system application.

2. Insertion of a remote handset plug into a jack shall send a signal to the fire command center which shall audibly and visually indicate the on-line condition, and shall sound a ring indication in the handset.

3. The two-way emergency telephone system shall support a minimum of seven (7) handsets on line without degradation of the signal.

E. Fixed Emergency Telephone Handset

1. The telephone cabinet shall be painted red and clearly labeled emergency telephone. The cabinets shall be located where shown on drawings.

2. The handset cradle shall have a switch connection such that lifting the handset off of the cradle shall send a signal to the fire command center which shall audibly and visually indicate its on-line (off-hook) condition.

3. The two-way emergency telephone system shall support a maximum of seven (7) handsets on line (off hook) without degradation of the signal.

F. Universal Digital Alarm Communicator Transmitter (UDACT). The UDACT is an interface for communicating digital information between a fire alarm control panel and an UL-Listed central station.

1. The UDACT shall be compact in size, mounting in a standard module position of the fire alarm control cabinet. Optionally, the UDACT shall have the ability for remote mounting, up to 6,000 feet from the fire alarm control panel. The wire connections between the UDACT and the control panel shall be supervised with one pair for power and one pair for multiplexed communication of overall system status. Systems that utilize relay contact closures are not acceptable.

2. The UDACT shall include connections for dual telephone lines (with voltage detect), per UL/NFPA/FCC requirements. It shall include the ability for split reporting of panel events up to two different telephone numbers.

3. The UDACT shall be capable of transmitting events in 4+2, SIA, and Contact ID.

4. Communication shall include vital system status such as:

    a. Independent Zone (Alarm, trouble, non-alarm, supervisory)
    b. Independent Addressable Device Status
    c. AC (Mains) Power Loss
    d. Low Battery and Earth Fault
    e. System Off Normal
    f. 12 and 24 Hour Test Signal
    g. Abnormal Test Signal (per UL requirements)
    h. EIA-485 Communications Failure
    i. Phone Line Failure

5. The UDACT shall support independent zone/point reporting when used in the Contact ID format. In this format the UDACT shall support transmission of up to 3,064 points. This enables the central station to have exact details concerning the origin of the fire or response emergency.

6. The UDACT shall be capable of being programmed with the same programming utility as the host FACP, and saved, edited and uploaded and downloaded using the utility. UDACT shall be capable of being programmed online or offline. The programming utility shall also support upgrading UDACT operating firmware.

7. The UDACT shall be capable of generating Central Station reports providing detailed programming information for each point along with the central station point address.

8. An IP or IP/GSM Communicator option shall be available to interface to the UDACT and be capable of transmitting signals over the internet/intranet or Cellular (GSM) network to a compatible receiver.

G. Field Wiring Terminal Blocks

1. For ease of service all panel I/O wiring terminal blocks shall be removable, plug-in types and have sufficient capacity for #18 to #12 AWG wire. Terminal blocks that are permanently fixed are not acceptable.

H. Printer

1. The printer shall provide hard-copy printout of all changes in status of the system and shall time-stamp such printouts with the current time-of-day and date. The printer shall be standard carriage with 80-characters per line and shall use standard pin-feed paper. The printer shall be enclosed in a separate cabinet suitable for placement on a desktop or table. The printer shall communicate with the control panel using an interface complying with Electrical Industries Association standard EIA-232D. Power to the printer shall be 120 VAC @ 60 Hz.

2. The system shall have a strip printer capable of being mounted directly in the main FACP enclosure. Alarms shall be printed in easy-to-read RED, other messages, such as a trouble, shall be printed in BLACK. This printer shall receive power from the system power supply and shall operate via battery back-up if AC mains are lost. The strip printer shall be UL 864 listed.

3. The system shall have a strip printer capable of being mounted directly in the main FACP enclosure. Alarms shall be printed in easy-to-read RED, other messages, such as a trouble, shall be printed in BLACK. This printer shall receive power from the system power supply and shall operate via battery back-up if AC mains are lost. The strip printer shall be UL 864 listed.

I. Smoke Control Annunciator

1. On/Auto/Off switches and status indicators (LEDS) shall be provided for monitoring and manual control of each fan, damper, HVAC control unit, stairwell pressurization fan, and smoke exhaust fan. To ensure compliance the units supplied shall meet the following UL categories: UUKL, PAZX, UDTZ, QVAX as well as the requirements of NFPA 90A, HVAC, and NFPA 92A & 92B, Smoke Control. The control System shall be field programmable for either 90A operation or 92A/B operation to allow for future use and system expansion.

2. The OFF LED shall be Yellow, the ON LED shall be green, the Trouble/Fault LED shall be Amber/Orange for each switch. The Trouble/Fault indicator shall indicate a trouble in the control and/or monitor points associated with that switch. In addition, each group of eight switches shall have two LEDS and one momentary switch which allow the following functions: An Amber LED to indicate an OFF-NORMAL switch position, in the ON or OFF position; A Green LED to indicate ALL AUTO switch position; A Local Acknowledge/Lamp Test momentary switch.

3. Each switch shall have the capability to monitor and control two addressable inputs and two addressable outputs. In all modes, the ON and OFF indicators shall continuously follow the device status not the switch position. Positive feedback shall be employed to verify correct operation of the device being controlled. Systems that indicate on/off/auto by physical switch position only are not acceptable.

4. All HVAC switches (i.e., limit switches, vane switches, etc.) shall be provided and installed by the HVAC contractor.

5. It shall be possible to meet the requirements mentioned above utilizing wall mounted custom graphic.

2.4 GATEWAY & WEBSERVER OPTIONS

A. Common Alerting Protocol (CAP) Gateway: The system shall support an optional CAP Gateway (Common Alerting Protocol). The CAP Gateway translates fire system messages to industry standard CAP messages for integration with CAP-compliant clients. A CAP gateway shall be available from the fire alarm control panel manufacturer.

B. LEDSIGN Gateway: The system shall support an optional and proprietary LEDSIGN Gateway to interface to LED signs that will automatically display emergency messages. The signs shall be capable of storing up to 100 messages that can be activated via system programming with the ability to be manually overridden. The Sign Gateway shall support up to 10 independent signs, each sign capable of playing an independent message. Multiple LEDSIGN Gateways can be used in network applications. An LEDSIGN gateway shall be available from the fire alarm control panel manufacturer.

C. BACnet Interface Gateway: The system shall be capable of being interfaced with BACNet compliant clients. A BACnet interface supporting BACnet/IP communication shall be available from the fire alarm control panel manufacturer.

D. MODbus Interface Gateway: The system shall be capable of being interfaced with MODbus compliant clients. A MODbus interface supporting MODbus/TCP communication shall be available from the fire alarm control panel manufacturer.

E. Noti-Fire-Net Gateway: The system shall support an IP based gateway to enable the panel or local Noti-Fire-Net to be connected to an ONYXWorks workstation via the Internet or Intranet. This gateway shall also support the ability to integrate the system to an interactive firefighter's display. The Noti-Fire-Net Gateway shall be available from the fire alarm control manufacturer.

F. Webserver: The system shall support a webserver allowing remote connection via the Internet or Intranet. Authorized users will have the ability to view panel/network history, event status and device properties. The webserver shall also support sending event information via email or text to up to 50 registered users, the webserver shall be available from the fire alarm control panel manufacturer.

G. Web Portal Interface: The system shall be capable of being interfaced with a web portal to integrate with Inspection and Service Manager utilities. The web portal and inspection and service manager utilities shall be available from the fire alarm control panel manufacturer.

2.5 SYSTEM COMPONENTS - ADDRESSABLE DEVICES

A. Addressable Devices – General

1. Addressable devices shall provide an address-setting means using rotary decimal switches. Addressable devices that require the address be programmed using a programming utility are not an allowable substitute.

2. Addressable devices shall use simple to install and maintain decade, decimal address switches. Devices shall be capable of being set to an address in a range of 001 to 159.

3. Addressable devices, which use a binary-coded address setting method, such as a DIP-switch, are not an allowable substitute. Addressable devices that require the address be programmed using a special tool or programming utility are not an allowable substitute.

4. Addressable devices, which use a binary-coded address setting method, such as a DIP-switch, are not an allowable substitute. Addressable devices that require the address be programmed using a special tool or programming utility are not an allowable substitute.

5. Detectors shall be intelligent (analog) and addressable, and shall connect with two wires to the fire alarm control panel Signaling Line Circuits.

6. Addressable smoke and thermal detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash green under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady red illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.

7. The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. The panel on a time-of-day basis shall automatically adjust sensitivity.

8. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72.

9. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Base options shall include a sounder base with a built-in (local) sounder rated at 85 DBA minimum, a relay base and an isolator base designed for Style 7 applications. The system shall also support an intelligent programmable sounder base, the programmable sounder base shall be capable of providing multiple tones based on programming and at a minimum be capable of providing a Temp-4 tone for CO (Carbon Monoxide) activation and a Temp-3 tone for fire activations and be capable of being synchronized with other programmable sounder bases and common area notification appliances; 85 DBA minimum.

10. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).

11. Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.

12. Addressable devices shall store an internal identifying code that the control panel shall use to identify the type of device.

13. A magnetic test switch shall be provided to test detectors and modules. Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.

14. Addressable modules shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box. An optional surface mount Lexan enclosure shall be available.

B. Addressable Manual Fire Alarm Box (manual station)

1. Addressable manual fire alarm boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.

2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.

3. Manual fire alarm boxes shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger.

C. Intelligent Photoelectric Smoke Detector: The intelligent photoelectric smoke detector shall be GAMEWELL-FCI model and shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.

D. Intelligent VIEW® Laser Photo Smoke Detector: The intelligent laser photo smoke detector shall be a spot type detector, GAMEWELL-FCI model, that incorporates an extremely bright laser diode and an integral lens that focuses the light beam to a very small volume near a receiving photo sensor. The scattering of smoke particles shall activate the photo sensor.

1. The laser detector shall have conductive plastic so that dust accumulation is reduced significantly.

2. The intelligent laser photo detector shall have nine sensitivity levels and be sensitive to a minimum obscuration of 0.02 percent per foot.

3. The laser detector shall not require expensive conduit, special fittings or PVC pipe.

4. The intelligent laser photo detector shall support standard, relay, isolator and sounder detector bases.

5. The laser photo detector shall not require other cleaning requirements than those listed in NFPA 72. Replacement, refurbishment or specialized cleaning of the detector head shall not be required.

6. The laser photo detector shall include two bicolor LEDs that flash green in normal

operation and turn on steady red in alarm.

E. Intelligent Ionization Smoke Detector: The intelligent ionization smoke detector shall be GAMEWELL-FCI model and shall use the dual-chamber ionization principal to measure products of combustion and shall, on command from the control panel, send data to the panel representing the analog level of products of combustion.

F. Intelligent Multi Criteria Acclimating Detector: The intelligent multi-criteria Acclimate® Plus™ detector shall be an addressable device, GAMEWELL-FCI model, that is designed to monitor a minimum of photoelectric and thermal technologies in a single sensing device. The design shall include the ability to adapt to its environment by utilizing a built-in microprocessor to determine its environment and choose the appropriate sensing settings. The detector design shall allow a wide sensitivity window, no less than 1 to 4% per foot obscuration. This detector shall utilize advanced electronics that react to slow smoldering fires and thermal properties all within a single sensing device.

1. The microprocessor design shall be capable of selecting the appropriate sensitivity levels based on the environment type it is in (office, manufacturing, kitchen etc.) and then have the ability to automatically change the setting as the environment changes (as walls are moved or as the occupancy changes).

2. The intelligent multi criteria detection device shall include the ability to combine the signal of the thermal sensor with the signal of the photoelectric signal in an effort to react hastily in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a false alarm condition by examining the characteristics of the thermal and smoke sensing chambers and comparing them to a database of actual fire and deceptive phenomena.

G. Intelligent Thermal Detectors: The intelligent thermal detectors shall be GAMEWELL-FCI addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. A high heat thermal detector rated at 190 degrees Fahrenheit shall also be available. The thermal detectors shall connect via two wires to the fire alarm control panel signaling line circuit.

H. Intelligent Duct Smoke Detector: The smoke detector housing shall accommodate an intelligent photoelectric detector that provides continuous analog monitoring and alarm verification from the panel. When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system. The Intelligent Duct Smoke Detector shall support the installation of addressable Photoelectric detector capable or being tested remotely. The remote test capable photoelectric smoke detector shall be GAMEWELL-FCI model.

I. Multi-Criteria Intelligent Detector

1. Intelligent multi-criteria fire detector shall be a GAMEWELL-FCI model. Smoke detector shall be an addressable intelligent multi-criteria smoke detector. The detector shall be comprised of four sensing elements, including a photoelectric (light-scattering) particulate sensor, an electrochemical carbon monoxide (CO) sensor, a daylight-filtered infrared sensor and solid state thermal sensor(s) rated

at 135°F (57.2°C). The device shall be able to indicate distinct smoke and heat alarms.

2. The intelligent multi-criteria detection device shall include the ability to combine the signal of the photoelectric signal with other sensing elements in an effort to react quickly in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a nuisance alarm condition. The product design shall be capable of selecting the appropriate sensitivity levels based on the environment type chosen by user in which it is installed (office, manufacturing, kitchen etc.) and then have the ability to automatically change the setting as the environment changes.

3. The detector shall be capable of automatically adjusting its sensitivity by means of drift compensation and smoothing algorithms. The detector shall be capable of automatically adjusting its sensitivity by means of drift compensation and smoothing algorithms. The device shall provide unique signals to indicate when 20% of the drift range is remaining, when 100% of drift range is used, and when there is a chamber fault to show unit requires maintenance.

4. The detector shall indicate CO trouble conditions including 6 months of sensor life remaining and sensor life has expired. The detector shall indicate a combined signal for any of the following: low chamber trouble, thermistor trouble, CO self test failure, IR self test failure, and freeze warning.

5. The detectors shall provide address-setting means on the detector head using rotary switches. Because of the possibility of installation error, systems that use binary jumpers or DIP switches to set the detector address are not acceptable. The detectors shall also store an internal identifying code that the control panel shall use to identify the type of detector. Systems that require a special programmer to set the detector address (including temporary connection at the panel) are labor intensive and not acceptable. Each detector occupies any one of at least 99 possible addresses on the signaling line circuit (SLC) loop. It responds to regular polls from the system and reports its type and status.

6. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a switch) or initiated remotely on command from the control panel. There are three test methods: functional magnet, smoke entry aerosol, or direct heat method.

7. The detectors shall provide two LEDs to provide 360° visibility. The LEDs are placed into steady red illumination by the control panel indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED, sounder base, and / or relay base (optional accessories). The external remote alarm can be interconnected to other sounder or relay bases for activating all devices in a space via a single alarming unit.

8. Two LEDs on the sensor are controlled by the panel to indicate sensor status. Coded signals, transmitted from the panel, can cause the LEDs to blink, latch on, or latch off. Refer to the control panel technical documentation for sensor LED status operation and expected delay to alarm.

9. The detectors shall be ceiling-mount and shall be plug-in mounted into a twist-lock base. These detectors shall be constructed of off-white UV resistant polymer and shall be detachable from the mounting base to simplify installation, service and maintenance. Mounting base wiring connections shall be made by means of SEMS screws. The detector shall allow pre-wiring of the base and the head shall be a plug-in type. Mounting base shall be mounted on junction box which is at least 1.5 inches (3.81 cm) deep. Mounting base shall be available to mount to standard junction boxes. Suitable boxes include:

    a. 4.0" (10.16 cm) square box with and without plaster ring.
    b. 4.0" (10.16 cm) octagonal box.
    c. 3.5" (8.89 cm) octagonal box.
    d. Single-gang box.

10. Meets Agency Standards

    a. ANSI/UL 268 -Smoke Detectors for Fire Alarm Signaling Systems
    b. CAN/ULC-S529- Smoke Detectors for Fire Alarm Systems
    c. FM 3230-3250- Smoke Actuated Detectors for Automatic Fire Alarm Signaling

J. Multi-Criteria Intelligent Fire/CO Detector

1. Multi-Criteria Fire/CO detector shall be GAMEWELL-FCI model and shall be an addressable advanced multi-criteria smoke detector with a separate signal for carbon monoxide (CO) detection per UL 2075 standards.

2. The detector shall be comprised of four sensing elements, including a photoelectric (light-scattering) particulate sensor, an electrochemical CO sensor, a daylight-filtered infrared (IR) sensor and solid state thermal sensor(s) rated at 135°F (57.2°C). The device shall be able to indicate distinct smoke and heat alarms.

3. The advanced multi-criteria detection device shall include the ability to combine the signal of the photoelectric signal with other sensing elements in order to react quickly in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a nuisance alarm condition. The detector shall be capable of selecting the appropriate sensitivity levels based on the environment type (office, manufacturing, kitchen, etc.) in which it is installed, and then have the ability to automatically change the setting as the environment changes.

4. The CO detector component shall be capable of a functional gas test using a canned test agent to test the functionality of the CO sensing cell.

5. The detector shall be capable of automatically adjusting its sensitivity by means of drift compensation and smoothing algorithms. The device shall provide unique signals to indicate when 20 percent of the drift range is remaining, when 100 percent of drift range is used, and when there is a chamber fault to show the unit requires maintenance.

6. The detector shall indicate CO trouble conditions, including six months of sensor life remaining and sensor life has expired. The detector shall indicate a combined signal for any of the following: low chamber trouble, thermistor trouble, CO self test

failure, IR self test failure, and freeze warning.

7. The detector shall provide address-setting means on the detector head using rotary switches. Because of the possibility of installation error, systems that use binary jumpers or DIP switches to set the detector address are not acceptable. The detector shall also store an internal identifying code that the control panel shall use to identify the type of detector. Systems that require a special programmer to set the detector address (including temporary connection at the panel) are labor intensive and not acceptable. Each detector occupies any one of at least 159 possible addresses on the signaling line circuit (SLC) loop. It responds to regular polls from the system and reports its type and status.

8. The detector shall provide a test means whereby it will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a switch) or initiated remotely on command from the control panel. There shall be four test methods: functional magnet, smoke entry aerosol, carbon monoxide aerosol or direct heat method.

9. The detector shall provide two LEDs to provide 360° visibility. The LEDs shall be placed into steady red illumination by the control panel indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED. The detector must be capable of connecting to a sounder base that provides both temporal 3 and temporal 4 patterns for fire and CO alarm.

10. Two LEDs on the sensor shall be controlled by the panel to indicate sensor status. Coded signals, transmitted from the panel, shall cause the LEDs to blink, latch on, or latch off. Refer to the control panel technical documentation for sensor LED status operation and expected delay to alarm.

11. The detector shall be plug-in mounted into a twist-lock base. The detector shall be constructed of off-white, UV-resistant polymer and shall be detachable from the mounting base to simplify installation, service and maintenance. Mounting base wiring connections shall be made by means of SEMS screws. The detector shall allow pre-wiring of the base and the head shall be a plug-in type. The mounting base shall be mounted on a junction box that is at least 1.5 inches (3.81 cm) deep. The mounting base shall be available to mount to standard junction boxes. Suitable boxes include:

    a. 4.0" (10.16 cm) square box with and without plaster ring.
    b. 4.0" (10.16 cm) octagonal box.
    c. 3.5" (8.89 cm) octagonal box.
    d. Single-gang box.
    e. Double-gang box

12. Meets Agency Standards

    a. ANSI/UL 268 -Smoke Detectors for Fire Alarm Signaling Systems
    b. CAN/ULC-S529- Smoke Detectors for Fire Alarm Systems
    c. FM 3230-3250- Smoke Actuated Detectors for Automatic Fire Alarm Signaling
    d. UL 2075 – Gas and Vapor Detector and Sensors – Systems Connected

K. Intelligent Addressable Aspiration Detector: The intelligent aspiration detector shall be GAMEWELL-FCI model an addressable aspiration detector that communicates directly with the fire alarm control panel via the SLC communication protocol, no modules or high level interfaces shall be required. The fire alarm control panel shall support up to thirty one intelligent aspiration detectors per SLC loop. The aspiration detector shall have dual source (blue LED and infra-red laser) optical smoke detection for a wide range of fire detection with enhanced immunity to nuisance particulates. The FACP shall be capable of monitoring and annunciating up to five smoke event thresholds and eleven trouble conditions. Each event threshold shall be capable of being assigned a discrete type ID at the FACP.

L. Intelligent Addressable Reflected Beam Detector

1. The intelligent single-ended reflected beam smoke detector shall connect with two wires to the fire alarm control panel signaling line circuit (SLC). The detectors shall consist of a transmitter/receiver unit and a reflector and shall send data to the panel representing the analog level of smoke density. The detector shall be capable of being tested remotely via a keyswitch. Model shall be equipped with an integral sensitivity test feature.

M. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLCs. The addressable monitor module shall be GAMEWELL-FCI model Class A or B.

2. The IDC zone shall be suitable for Style D/Class A or Style B/Class B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

3. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include Style D or an LED.

4. For multiple dry contact monitoring a module shall be available that provides 10 Style B or 5 Style D input circuits; GAMEWELL-FCI model.

N. Two Wire Detector Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device); GAMEWELL-FCI model.

2. The IDC zone may be wired for Class A or B (Style D or Style B) operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

3. For multiple 2-wire smoke detector circuit monitoring a module shall be available that provides 6 Style B/Class A or 3 Style D/Class B input circuits; GAMEWELL-FCI model.

O. Addressable Control Module

1. Addressable control modules shall be provided to supervise and control the operation of one conventional circuit of compatible Notification Appliances, 24 VDC powered, polarized audio/visual notification appliances; GAMEWELL-FCI model.

2. The control module NAC may be wired for Style Z or Style Y (Class A/B) with a current rating of 2 Amps for Style Z and 3 Amps for Style Y;

3. Audio/visual power shall be provided by a separate supervised circuit from the main fire alarm control panel or from a supervised UL listed remote supply.

4. For multiple circuit control a module shall be available that provides 6 Style Y (Class B) or 3 Style Z (Class A) control circuits; GAMEWELL-FCI model.

P. Addressable Releasing Control Module

1. An addressable releasing module shall be available to supervise and control compatible releasing agent solenoids; GAMEWELL-FCI model.

2. The module shall operate on a redundant protocol for added protection.

3. The module shall be configurable for Style Z or Style Y (Class A/B) and support one 24 volt or two 12 volt solenoids. Add FMM-4-20

Q. Addressable 4-20 mA module shall be available to monitor industry-standard, linear-scale, 4-20 mA protocol sensors. The module converts the sensor output to communication protocol that can be interpreted by the FACP for monitoring and display; GAMEWELL-FCI model.

1. The module shall support programming of up to five programmable event thresholds.

2. The System shall be Factory Mutual approved as a Gas Detection system when employed with the monitor module and industry standard 4-20 mA gas detectors.

R. Addressable Relay Module:

1. Addressable Relay Modules shall be available for HVAC control and other network building functions; GAMEWELL-FCI model

2. The module shall provide two form C relays rated at up to 3 Amps resistive and up to 2.0 Amps inductive.

3. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary devices energize at the same time on the same pair of wires;

4. For multiple relay control a module shall be available that provides 6 programmable Form-C relays; GAMEWELL-FCI model.

S. Addressable Two-In / Two-Out Monitor/Relay Module:

1. An addressable Two-In / Two-Out module shall be available.

2. The two-in/two-out module shall provide two Class B/Style B dry-contact input circuits and two independent Form-C relays rated at up to 3 Amps resistive and up to 2.0 Amps inductive.

T. Isolator Module: Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC Class A or Class B branch. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop segment or branch. At least one isolator module shall be provided for each floor or protected zone of the building; GAMEWELL-FCI model.

1. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.

2. The isolator module shall not require address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.

3. The isolator module shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

U. Serially Connected Annunciator Requirements

1. The annunciator shall communicate to the fire alarm control panel via an EIA 485 (multi-drop) two-wire communications loop. The system shall support two 6,000 ft. EIA-485 wire runs. Up to 32 annunciators, each configured up to 96 points, may be connected to the connection, for a system capacity of 3,072 points of annunciation.

2. An EIA-485 repeater shall be available to extend the EIA-485 wire distance in 3,000 ft. increments. The repeater shall be UL864 approved.

3. Each annunciator shall provide up to 96 alarm and 97 trouble indications using a long-life programmable color LED's. Up to 96 control switches shall also be available for the control of Fire Alarm Control Panel functions. The annunciator will also have an "ON-LINE" LED, local piezo sounder, local acknowledge and lamp test switch, and custom zone/function identification labels.

4. The annunciator may be field configured to operate as a "Fan Control Annunciator". When configured as "Fan Control," the annunciator may be used to manually control fan or damper operation and can be set to override automatic commands to all fans/dampers programmed to the annunciator.

5. Annunciator switches may be programmed for System control such as, Global Acknowledge, Global Signal Silence, Global System Reset, and on/off control of any control point in the system.

6. An optional module shall be available to utilize annunciator points to drive EIA-485 driven relays. This shall extend the system point capacity by 3,072 remote

contacts.

7. The LED annunciator shall offer an interface to a graphic style annunciator and provide each of the features listed above.

V. SpectrAlert Advance Speakers

1. The Speaker appliance shall be System Sensor SpectrAlert Advance Speaker. The speaker shall be listed to UL 1480 for Fire Protective Signaling Systems. It shall be a dual-voltage transformer speaker capable of operation at 25.0 or 70.7 nominal Vrms. The speaker shall have a frequency range of 400 to 4,000 Hz and shall have an operating temperature between 32°F and 120°F. It shall mount to a 4 x 4 x 2 1/8-inch back box.

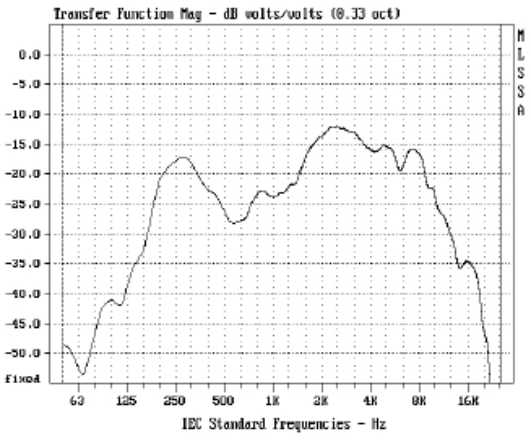
2. A universal mounting plate shall be used for mounting ceiling and wall speaker products. The notification appliance circuit and amplifier wiring shall terminate at the universal mounting plate.

3. Speakers shall be plug-in and shall have the ability to check wiring continuity via a shorting spring on the universal mounting plate. The shorting spring shall also provide tamper resistance via an open circuit if the device is removed. Speaker design shall isolate speaker components to reduce ground fault incidents.

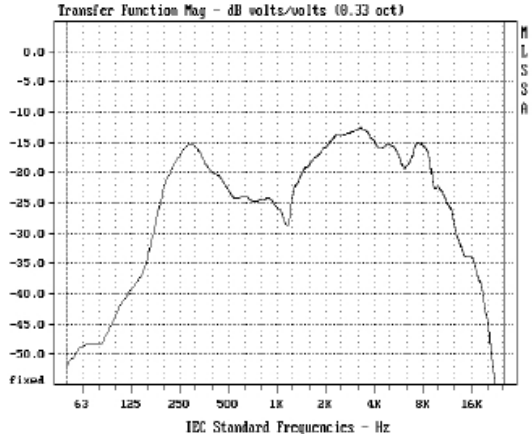
4. The speaker shall have power taps (from ¼ watt to 2 watts) and voltage that are selected by rotary switches. All models shall have a maximum sound output of 86 dB at 10 feet and shall incorporate an open back construction.

5. All notification appliances shall be backward compatible.

Ceiling Speaker
Wide Band Frequency Response



Wall Speaker
Wide Band Frequency Response



Note: The wide band frequency response is derived using MLS methods

W. SpectrAlert Advance Speaker Strobes

1. The Speaker Strobe appliance shall be System Sensor SpectrAlert Advance Speaker Strobe. The speaker strobe shall be listed to UL 1971 and UL 1480 and be approved for fire protective signaling systems. It shall be a dual-voltage

transformer speaker strobe capable of operation at 25.0 or 70.7 nominal Vrms. The speaker shall have a frequency range of 400 to 4,000 Hz and shall have an operating temperature between 32°F and 120°F. It shall mount to a 4 x 4 x 2 1/8-inch back box.

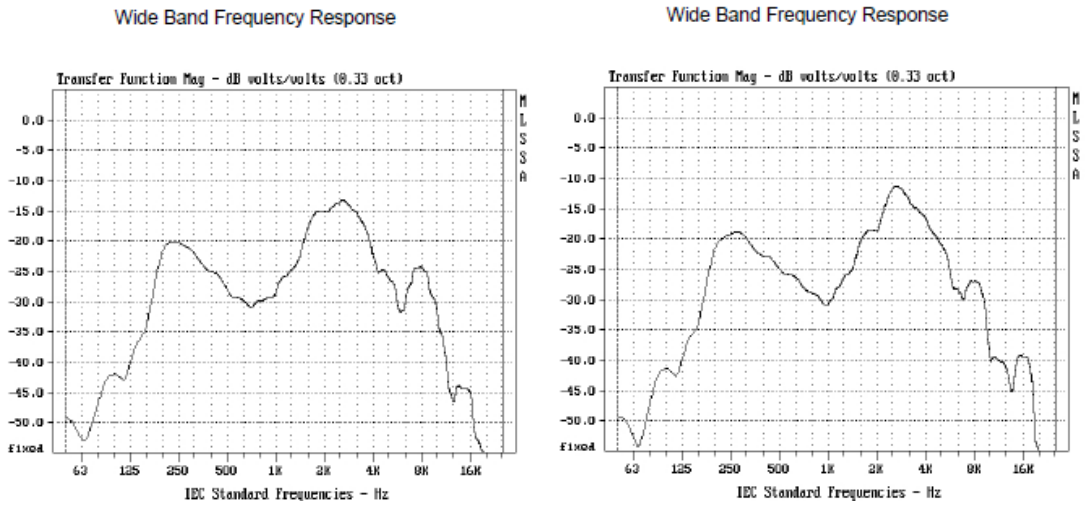
2. A universal mounting plate shall be used for mounting ceiling and wall speaker strobe products. The notification appliance circuit and amplifier wiring shall terminate at the universal mounting plate. Also, SpectrAlert Advance speaker strobes and the Sync•Circuit™ Module MDL3 accessory, if used, shall be powered from a non-coded notification appliance circuit output and shall operate on a nominal 12 or 24 volts (includes fire alarm panels with built in sync). When used with the Sync•Circuit Module MDL3, 12-volt rated notification appliance circuit outputs shall operate between 8.5 and 17.5 volts; 24-volt rated notification appliance circuit outputs shall operate between 16.5 to 33 volts. If the notification appliances are not UL 9th edition listed with the corresponding panel or power supply being used, then refer to the compatibility listing of the panel to determine maximum devices on a circuit.

3. Speaker strobes shall be plug-in and shall have the ability to check wiring continuity via a shorting spring on the universal mounting plate. The shorting spring shall also provide tamper resistance via an open circuit if the device is removed. Speaker strobe design shall isolate speaker components to reduce ground fault incidents.

4. The speaker strobe shall have power taps (from ¼ watt to 2 watts) and voltage that are selected by rotary switches. All models shall have a maximum sound output of 86 dB at 10 feet and shall incorporate an open back construction. The strobe shall consist of a xenon flash tube with associated lens/reflector system and operate on either 12V or 24V. The strobe shall also feature selectable candela output, providing options for 15 or 15/75 candela when operating on 12V and 15, 15/75, 30, 75, 110, or 115 when operating on 24V. The strobe shall comply with NFPA 72 and the Americans with Disabilities Act requirement for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range.

5. All notification appliances shall be backward compatible.

Ceiling Speaker Strobe Wall Speaker Strobe



Note: The wide band frequency response is derived using MLS methods

6. Strobe lights shall meet the requirements of the ADA, UL Standard 1971and be fully synchronized.

PART 3.0 - EXECUTION

3.1. GENERAL INSTALLATION REQUIREMENTS:

A. The wiring of the system shall be executed in accordance with the drawings and the equipment manufacturer's wiring diagrams. Should any variations in these requirements occur, the contractor shall notify the architect before making any changes. It shall be the responsibility of the factory-authorized distributor of the approved equipment to install the equipment and guarantee the system to operate as per plans and specifications.

B. Furnish all conduit, junction boxes, conductors, equipment plugs, terminal strips, etc., and labor to install a complete and operable system.

C. The cables within the rack or cabinets shall be carefully cabled and neatly dressed with hook-and-loop type fasteners or tie-wraps. All cables shall be numbered for identification.

D. Splicing of conductors in underground pull boxes is not permitted.

E. The labor employed by the contractor shall be regularly employed in the installation and repair of communication systems and shall be acceptable to the owner and architect to engage in the installation and service of this system.

F. The contractor shall thoroughly clean all equipment and materials. All exposed parts of the equipment, cabinets, and other equipment shall be left in a clean condition, unblemished and free of all dirt, dust, smudges, spots, fingerprints, etc., the contractor shall remove all debris and rubbish occasioned by the electronic systems work from the site. The contractor shall thoroughly clean all buildings of any dirt, debris, rubbish, marks, etc., caused by the performance of this work.

G. The system must meet all local and other prevailing codes.

H. All cabling installations shall be performed by qualified technicians.

I. All cabling shall be splice free.

J. In order to ensure the least amount of cable untwisting, it is required that all cables shall be stripped using a special tool.

K. Prior to the use of lubricants (i.e. Polywater) to facilitate the installation of cables, the contractor shall verify the acceptability of the lubricant to be used with the cable manufacturer, prior to using such a lubricant.

L. All firewalls penetrated by structured cabling shall be sealed by use a non-permanent fire blanket or other method in compliance with the current edition of National Fire Protection Association (NFPA) and the National Electrical Code (NEC), California Electrical Code (CEC), or other prevailing code. The contractor must not use concrete or other non-removable substance for fire stopping on cable trays, wireways or conduits. Contractors who use this method will be required to replace all cables affected and provide the original specified access to each effected area.

M. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

N. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

O. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

P. Manual fire alarm boxes shall be suitable for surface mounting or semi-flush mounting as shown on the plans and shall be installed not less than 42 inches (1067 mm), nor more than 48 inches (122 mm) above the finished floor.

3.2 SPECIFIC SYSTEM INSTALLATION REQUIREMENTS

A. The entire system shall be installed in a workmanlike manner in accordance with approved manufacturers manuals and wiring diagrams. The contractor shall furnish all wiring, conduit, outlet boxes, junction boxes, terminal cabinets and similar devices necessary for the completed installation.

B. Installation off conduit, outlet boxes, junction boxes, terminal cabinets, special back boxes and similar devices shall comply with the requirements of Section 26 00 00 General Electrical Materials.

C. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detector heads shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

D. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas. Verify with the Project Architect prior to any surface mounted installations.

E. All penetrations of floor slabs and fire walls, shall be fire stopped in accordance with the electrical specifications.

F. Duct mounted Smoke Detectors (when permitted for installation in writing by the engineer and District) shall be furnished and wired by this Contractor and installed by the Mechanical Contractor. All shutdown and interface wiring shall be performed by the Electrical Contractor. All air pressure differential testing shall be performed by the Mechanical/Air Balance Contractor.

G. The sprinkler flow and tamper switches shall be furnished, installed and adjusted by the Sprinkler Contractor, wired and tested by this Contractor.

3.3 GENERAL TESTING REQUIREMENTS

A. Provide all instruments for testing and demonstrating in the presence of the owner's inspector that the frequency response is as stated in the factory data sheets. Check all circuits and wiring to verify they are free of shorts and grounds.

3.4. SPECIFIC SYSTEM TESTING REQUIREMENTS

The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72.

A. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

B. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.

C. Verify activation of all waterflow switches.

D. Open initiating device circuits and verify that the trouble signal actuates.

E. Open and short signaling line circuits and verify that the trouble signal actuates.

F. Open and short notification appliance circuits and verify that trouble signal actuates.

G. Ground all circuits and verify response of trouble signals.

H. Check presence and audibility of tone at all alarm notification devices.

I. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.

J. Each of the alarm conditions that the system is required to detect should be introduced

on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

K. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

L. Contractor shall provide all DSA required testing and certification at no cost to the Owner.

M. Final Acceptance

1. The Owner or Owner's representative may visit the site during the installation of the system to ensure that correct installation practices are being followed.

2. The Owner or Owner's representative will conduct a final job review once the contractor has finished the job. This review will take place within one week after the contractor notifies the owner.

3. Two copies of all certification data and drawings for all identifications shall be provided to the Owner before the owner's review.

4. The Owner or Owner's representative will review the installation and certification data prior to the system acceptance.

5. The Owner or Owner's representative may test some of the systems features to ensure that the certification data is correct. If a substantial discrepancy is found, the Owner reserves the right to have an independent consultant perform a certification of the entire system. If such a procedure is undertaken, the cost of the testing will be billed back to the contractor.

6. In the event that repairs or adjustments are necessary, the contractor shall make these repairs at his own expense. All repairs shall be completed within ten (10) days from the time they are discovered.

7. The contractor shall provide not less than eight (8) hours for site instruction of personnel in the operation and maintenance of the installed systems. This instruction time shall be divided as directed by the Owner.

8. The contractor shall hand to the owner a copy of any applicable installation specific software configurations in disk format.

9. The contractor shall commission the entire system and all components in accordance with this document, the Construction Documents and Commissioning Plan, and Section 28 08 00 Commissioning of Electronic Safety and Security Systems.

3.5. FINAL INSPECTION:

A. At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

3.6. INSTRUCTION:

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation."

END OF SECTION

ABBREVIATIONS

4S/DP	4" SQUARE BY 2-1/8" DEEP BOX
ADA	AMERICAN WITH DISABILITIES ACT
A.F.F.	ABOVE FINISH FLOOR
A.F.G.	ABOVE FINISH GRADE
AWG	AMERICAN WIRE GAUGE
AMP, A	AMPERE
A.I.C. or AIC	AMPERES INTERRUPTING CAPACITY (SYMMETRICAL)
A.F.C. or AFC	AVAILABLE FAULT CURRENT
AF/AT	AMP FRAME, AMP TRIP
AHJ	AUTHORITY HAVING JURISDICTION
AS/AF	AMP SWITCH, AMP FUSE
ATS	AUTOMATIC TRANSFER SWITCH
AVG	AVERAGE
BJ	BONDING JUMPER
BDF	BUILDING DISTRIBUTION FRAME
BR	BRANCH
BLDG	BUILDING
CBC	CALIFORNIA BUILDING CODE
CEC	CALIFORNIA ELECTRICAL CODE
CIRC., CKT.	CIRCUIT
CB	CIRCUIT BREAKER
CSFD	COMBINATION SMOKE FIRE DAMPER
C	CONDUIT
C.O.	CONDUIT ONLY, COMPLETE WITH PULLSTRING
CONN	CONNECTED
CPT	CONTROL POWER TRANSFORMER
CLCB	CURRENT LIMITING CIRCUIT BREAKER
CLF	CURRENT LIMITING FUSE
CT	CURRENT TRANSFORMER
(D)	EXISTING DEVICE TO BE DEMOLISHED
DAS	DISTRIBUTED ANTENNA SYSTEM
DIA	DIAMETER
DISC	DISCONNECT
DIST	DISTRIBUTION
D.P.C.S.	DIMMING PANEL CONTROL STATION
E.C.	ELECTRICAL CONTRACTOR
EMS	ENERGY MANAGEMENT CONTROL SYSTEM
EMT	ELECTRICAL METALLIC TUBING
ENT	ELECTRICAL NON-METALLIC TUBING
EWC	ELECTRIC WATER COOLER
E.P.O.	EMERGENCY POWER OFF
E-O-L	END-OF-LINE CIRCUIT TERMINATOR
EF	EXHAUST FAN
EGC or EG or E/G	EQUIPMENT GROUND (GREEN)
(E)	EXISTING DEVICE TO REMAIN
EP	EXPLOSION PROOF
(ER)	EXISTING DEVICE TO BE RELOCATED
FT or '	FEET
FA or F.A.	FIRE ALARM
FLA	FULL LOAD AMPS
GRD	GROUND

GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFP	GROUND FAULT PROTECTION
GE or GEC	GROUNDING ELECTRODE CONDUCTOR
HACR	HEATING AIR CONDITIONING REFRIGERATION
HOA	HAND-OFF-AUTO
HVAC	HEATING, VENTILATING AND AIR CONDITIONING
H.,W.,D.,L.	HEIGHT, WIDTH, DEPTH, LENGTH
HID	HIGH INTENSITY DISCHARGE
HP	HORSEPOWER
HPS	HIGH PRESSURE SODIUM
IN. or "	INCHES
I/G	ISOLATED GROUND
IBC	INTERNATIONAL BUILDING CODE
I.D.C.S.	INTEGRATED DIMMING CONTROL PANEL
IDF	INTERMEDIATE DISTRIBUTION FRAME
JBOX	JUNCTION BOX
K	DEGREE KELVIN
KCMIL	THOUSAND CIRCULAR MILS
KVA	KILOVOLT AMPERES
KW	KILOWATT
KWH	KILOWATT HOUR
LCL	LONG CONTINUOUS LOAD
LF, L.F.	LINEAR FEET
LTG, LTS	LIGHTING
LPS	LOW PRESSURE SODIUM
MAX.	MAXIMUM
MBJ	MAIN BONDING JUMPER
MDF	MAIN DISTRIBUTION FRAME
MOCP	MAXIMUM OVERCURRENT PROTECTION
MCB	MAIN CIRCUIT BREAKER
MLO	MAIN LUGS ONLY
M.C.	MECHANICAL CONTRACTOR
M	METER
M/M	METER MAIN
MV	MERCURY VAPOR
MH	METAL HALIDE
MIN.	MINIMUM
MCA	MINIMUM CIRCUIT AMPS
MCC	MOTOR CONTROL CENTER
MCM	THOUSAND CIRCULAR MILS
MCP	MOTOR CIRCUIT PROTECTOR
MFR.	MANUFACTURER
MTD	MOUNTED
MW	MICROWAVE
NATS	NON AUTOMATIC DISCONNECT
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
NC	NORMALLY CLOSED

NO	NORMALLY OPENED
NF	NON-FUSED
NIC	NOT IN CONTRACT
N.T.S.	NOT TO SCALE
NL	NIGHT LIGHT
NO. or #	NUMBER
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
%Z	PERCENT IMPEDANCE
PH. or ø	PHASE
PC	PHOTOCELL
P.C.	PLUMBING CONTRACTOR
P	POLE
PVC	POLY VINYL CHLORIDE
PDU	POWER DISTRIBUTION UNIT
PRIMARY	OVER 600 VOLTS
PROVIDE	FURNISH, INSTALL AND CONNECT
PT	POTENTIAL TRANSFORMER
PA	PUBLIC ADDRESS
(R)	DENOTES RELOCATED DEVICE LOCATION.
REC, RECEPT	RECEPTACLE
REF	REFRIGERATOR
RGS	RIGID GALVANIZED STEEL
RMS	ROOT MEAN SQUARE
SCC	SHORT CIRCUIT CURRENT
SCCR	SHORT CIRCUIT CURRENT RATING
SCS	STRUCTURED CABLING SYSTEM
SFD	SMOKE FIRE DAMPER
SECONDARY	600 VOLTS AND LESS
SMACNA	SHEET METAL AND AIR COND. CONTRACTOR'S NAT'L ASSOC.
SQ.	SQUARE
SSBJ	SUPPLY SIDE BONDING JUMPER
SBJ	SYSTEM BONDING JUMPER
TC	TIMECLOCK
TEL/DATA	TELEPHONE AND DATA
TV	TELEVISION
T.V.S.S.	TRANSIENT VOLTAGE SURGE SUPPRESSION
TYP	TYPICAL
U.G.P.S.	UNDERGROUND PULL SECTION
U.O.N.	UNLESS OTHERWISE NOTED
U.P.S. or UPS	UNINTERRUPTABLE POWER SYSTEM
VAV	VARIABLE AIR VOLUME
V	VOLTS
VA	VOLT AMPERES
VD	VOLTAGE DROP
WP	WEATHERPROOF
W	WIRE
XFMR	TRANSFORMER

FIRE ALARM SYSTEM SYMBOLS

SEE FIRE ALARM OR CENTRAL MONITORING SYSTEM DRAWINGS FOR FIRE ALARM SYMBOLS.

SIGNAL SYSTEM SYMBOLS

- WALL MOUNTED CLOCK. FIELD VERIFY MOUNTING HEIGHT PRIOR TO INSTALLATION. BATTERY POWERED. OFCI
- [S] V — SURFACE WALL MOUNTED SPEAKER, "V" INDICATES VOLUME CONTROL.
- [S] V — SURFACE MOUNTED SPEAKER, "V" INDICATES VOLUME CONTROL.
- (S) V — FLUSH WALL MOUNTED SPEAKER, "V" INDICATES VOLUME CONTROL.
- (S) V — CEILING FLUSH MOUNTED SPEAKER, "V" INDICATES VOLUME CONTROL.

TELEPHONE/DATA SYMBOLS

- TELEPHONE OUTLET BOX, WALL MOUNTED. STUB A 1"C.O. UP 6" ABOVE THE ACCESSIBLE CEILING AND PROVIDE A BUSHING. 4S/DP MINIMUM WITH SINGLE GANG RING.
  - "W" = WALL MOUNTED PHONE.
  - "P" = PUBLIC (PAY) PHONE. VERIFY ALL REQUIREMENTS WITH THE TELEPHONE UTILITY COMPANY. PROVIDE 1"C.O. (MIN) TO THE MAIN TELEPHONE BACKBOARD. MOUNTING HEIGHT AS REQUIRED.
- DATA OUTLET BOX, WALL MOUNTED. STUB A 1"C.O. UP 6-INCHES ABOVE THE ACCESSIBLE CEILING AND PROVIDE A BUSHING. 4S/DP MINIMUM WITH SINGLE GANG RING.
- COMBINATION TELEPHONE AND DATA OUTLET BOX, WALL MOUNTED. STUB A 1"C.O. UP 6-INCHES ABOVE THE ACCESSIBLE CEILING AND PROVIDE A BUSHING. 4S/DP MINIMUM WITH SINGLE GANG RING.
- TELEPHONE OUTLET BOX, FLUSH MOUNTED IN CEILING. MOUNT FLUSH IN FLOOR WHEN INDICATED IN A FLOOR BOX SYMBOL.
- DATA OUTLET BOX FLUSH MOUNTED IN CEILING. MOUNT FLUSH IN FLOOR WHEN INDICATED IN A FLOOR BOX SYMBOL.
- COMBINATION TELEPHONE AND DATA OUTLET BOX FLUSH MOUNTED IN CEILING. MOUNT FLUSH IN FLOOR WHEN INDICATED IN A FLOOR BOX SYMBOL.
- TELEPHONE OUTLET BOX, WALL MOUNTED 6-INCHES ABOVE COUNTER OR SPLASH. STUB A 1"C.O. UP 6-INCHES ABOVE THE ACCESSIBLE CEILING AND PROVIDE A BUSHING. 4S/DP MINIMUM WITH SINGLE GANG RING.
- DATA OUTLET BOX, WALL MOUNTED 6-INCHES ABOVE COUNTER OR SPLASH. STUB A 1"C.O. UP 6-INCHES ABOVE THE ACCESSIBLE CEILING AND PROVIDE A BUSHING. 4S/DP MINIMUM WITH SINGLE GANG RING.
- COMBINATION TELEPHONE AND DATA OUTLET BOX, WALL MOUNTED 6-INCHES ABOVE COUNTER OR SPLASH. STUB A 1"C.O. UP 6-INCHES ABOVE THE ACCESSIBLE CEILING AND PROVIDE A BUSHING. 4S/DP MINIMUM WITH SINGLE GANG RING.
- COMBINATION TELEPHONE AND DATA OUTLET BOX MOUNTED IN ACCESSIBLE CEILING SPACE OR IN FLOOR BOX PER PLAN FOR FLEXIBLE CONNECTION TO FURNITURE SYSTEM. VERIFY CONNECTION REQUIREMENTS WITH MANUFACTURER PRIOR TO ROUGH-IN. MOUNT FLUSH IN FLOOR WHEN INDICATED IN A FLOOR BOX SYMBOL.
- COMBINATION TELEPHONE AND DATA OUTLET, WALL MOUNTED AT +18-INCHES A.F.F. FOR FLEXIBLE CONNECTION TO FURNITURE SYSTEM. PROVIDE THE FOLLOWING:
  - IN A NON-RATED INSULATED WALL, OR NON-RATED UNINSULATED WALL, PROVIDE A 2-GANG MUD RING OR CADDY #RBS SERIES BOX MOUNTING BRACKET (EQUAL BY B-LINE OR RAYCO) WITH (2) 1-1/2"C.O. WITH PULL STRING TO ACCESSIBLE CEILING. PROVIDE 1-1/2" BUSHINGS AT CONDUIT ENDS. REFER TO ARCHITECTURAL PLANS FOR WALL CONSTRUCTION/TYPE AND CEILING CONDITIONS.
  - IN A RATED WALL, PROVIDE (1) 4S/DP BOX WITH (2) 1-1/4"C.O. AND (1) 4S/DP BOX WITH (1) 1-1/4" C.O. WITH PULL STRINGS IN EACH CONDUIT TO ACCESSIBLE CEILING. PROVIDE 1-1/4" BUSHINGS AT CONDUIT ENDS. UTILIZE CADDY #RBS SERIES BOX MOUNTING BRACKET TO MAINTAIN BOX ALIGNMENT (EQUAL BY B-LINE OR RAYCO). UTILIZE FIRESTOPPING SYSTEM PADS RATED FOR USE ON THE INSIDE OR OUTSIDE OF THE BOX (STI OR EQUAL) AS REQUIRED TO MAINTAIN RATING OF WALL OR MEMBRANE. REFER TO ARCHITECTURAL PLANS FOR WALL CONSTRUCTION/TYPE AND CEILING CONDITIONS.
- —T1— CONCEALED TELEPHONE/DATA CONDUIT RUN, 1-INCH CONDUIT ONLY (MIN). SEE TABLE FOR CONDUIT SIZE VARIATIONS.
  T2 = 1-1/4" C.O. T3 = 1-1/2" C.O. T4 = 2" C.O.
- FLUSH MOUNTED, LOCKABLE TERMINAL CABINET WITH TERMINAL STRIPS AS REQUIRED.
- SURFACE MOUNTED, LOCKABLE TERMINAL CABINET WITH TERMINAL STRIPS AS REQUIRED.
- TELEPHONE TERMINAL BACKBOARD SIZED AS NOTED. REFER TO SYSTEM GROUND DETAIL.

MEP COMPONENT ANCHORAGE NOTE:

ALL MECHANICAL, PLUMBING, AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE DSA-APPROVED CONSTRUCTION DOCUMENTS. THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2019 CBC SECTIONS 1617A.1.18 THROUGH 1617A.1.26 AND ASCE 7-16 CHAPTERS 13, 26, AND 30.

1. ALL PERMANENT EQUIPMENT AND COMPONENTS.
2. TEMPORARY, MOVABLE OR MOBILE EQUIPMENT THAT IS PERMANENTLY ATTACHED (E.G. HARD WIRED) TO THE BUILDING UTILITY SERVICES SUCH AS ELECTRICITY, GAS OR WATER. "PERMANENTLY ATTACHED" SHALL INCLUDE ALL ELECTRICAL CONNECTIONS EXCEPT PLUGS FOR 110/220 VOLT RECEPTACLES HAVING A FLEXIBLE CABLE.
3. TEMPORARY, MOVABLE OR MOBILE EQUIPMENT WHICH IS HEAVIER THAN 400 POUNDS OR HAS A CENTER OF MASS LOCATED 4 FEET OR MORE ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT IS REQUIRED TO BE RESTRAINED IN A MANNER APPROVED BY DSA.

THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE BUT NEED NOT DEMONSTRATE DESIGN COMPLIANCE WITH THE REFERENCES NOTED ABOVE. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING, AND CONDUIT. FLEXIBLE CONNECTIONS MUST ALLOW MOVEMENT IN BOTH TRANSVERSE AND LONGITUDINAL DIRECTIONS:

A. COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVING A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.
B. COMPONENTS WEIGHING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.

THE ANCHORAGE OF ALL MECHANICAL, ELECTRICAL AND PLUMBING COMPONENTS SHALL BE SUBJECT TO THE APPROVAL OF THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE OR STRUCTURAL ENGINEER DELEGATED RESPONSIBILITY AND ACCEPTANCE BY DSA. THE PROJECT INSPECTOR WILL VERIFY THAT ALL COMPONENTS AND EQUIPMENT HAVE BEEN ANCHORED IN ACCORDANCE WITH THE ABOVE REQUIREMENTS.

PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEM BRACING NOTE:

PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS SHALL BE BRACED TO COMPLY WITH THE FORCES AND DISPLACEMENTS PRESCRIBED IN ASCE 7-16 SECTION 13.3 AS DEFINED IN ASCE 7-16 SECTIONS 13.6.5, 13.6.6, 13.6.7, 13.6.8; AND 2019 CBC, SECTIONS 1617A.1.24, 1617A.1.25 AND 1617A.1.26.

THE METHOD OF SHOWING BRACING AND ATTACHMENTS TO THE STRUCTURE FOR THE IDENTIFIED DISTRIBUTION SYSTEM ARE AS NOTED BELOW. WHEN BRACING AND ATTACHMENTS ARE BASED ON A PREAPPROVED INSTALLATION GUIDE (E.G. OSHPD OPM FOR 2013 CBC OR LATER), COPIES OF THE BRACING SYSTEM INSTALLATION GUIDE OR MANUAL SHALL BE AVAILABLE ON THE JOBSITE PRIOR TO THE START OF AND DURING THE HANGING AND BRACING OF THE DISTRIBUTION SYSTEMS. THE STRUCTURAL ENGINEER OF RECORD SHALL VERIFY THE ADEQUACY OF THE STRUCTURE TO SUPPORT THE HANGER AND BRACE LOADS.

MECHANICAL PIPING (MP), MECHANICAL DUCTS (MD), PLUMBING PIPING (PP), ELECTRICAL DISTRIBUTION SYSTEMS (E):

MP☐ MD☐ PP☐ E☒ OPTION 1: DETAILED ON THE APPROVED DRAWINGS WITH PROJECT SPECIFIC NOTES AND DETAILS.

MP☐ MD☐ PP☐ E☐ OPTION 2: SHALL COMPLY WITH THE APPLICABLE OSHPD PRE-APPROVAL (OPM#) #0052-13 & #0043-13.

LIGHTING SYMBOLS

SITE LIGHTING FIXTURE SYMBOLS DEPICTED WITH CAPITAL LETTER(S) ADJACENT TO RESPECTIVE SYMBOL(S) INDICATE(S) LIGHT FIXTURE MOUNTING BASE DETAIL(S). SEE LIGHTING FIXTURE SCHEDULE FOR FIXTURE SYMBOL INFORMATION.

- 1a — LIGHTING FIXTURE CALL OUT, NUMBER(S) AND/OR UPPER CASE LETTER(S) (i.e. "1") INDICATES FIXTURE TYPE (REFER TO LIGHTING FIXTURE SCHEDULE). LOWER CASE LETTER (i.e. "a") ADJACENT TO FIXTURE TYPE INDICATES BALLAST OPTION (SEE GENERAL LIGHTING FIXTURE SCHEDULE NOTES).
- J — INDICATES FINAL CONNECTION TO A LIGHTING FIXTURE, NUMBER OF CONDUCTORS AS REQUIRED.

LIGHTING CONTROL SYMBOLS

SEE THE DISTRIBUTED LIGHTING CONTROL (DLCS) SPECIFICATIONS AND SEQUENCE OF OPERATIONS (SOO) FOR MORE INFORMATION.

- LOW VOLTAGE WIRING INTERCONNECTING DLCS COMPONENTS AS REQUIRED. SEE DLCS SPECIFICATIONS FOR MORE INFORMATION.
- D — WALL MOUNTED DIMMER. SEE SINGLE POLE SWITCH SYMBOL FOR RELATED SUBSCRIPTS. QUANTITY OF ADJACENT LOWER CASE LETTERS INDICATES QUANTITY OF DIMMERS REQUIRED. PROVIDE DIMMER TYPE TO MATCH INDICATED BALLAST TYPE AND CONTROL REQUIREMENTS.
- X y — WALL MOUNTED STAND ALONE OCCUPANCY SENSOR.
- H y — WALL MOUNTED SYSTEM-BASED OCCUPANCY SENSOR.
- H,AV,DM,P y — 1-WAY DIRECTIONAL CEILING MOUNTED, SYSTEM-BASED OCCUPANCY SENSOR.
- H,AV,DM,P y — 2-WAY DIRECTIONAL CEILING MOUNTED, SYSTEM-BASED OCCUPANCY SENSOR.
- L K,V y — LOW VOLTAGE MOMENTARY SWITCHES, WALL MOUNTED, FOR MANUAL ON/OFF SWITCHING, DIMMING, AND OVERRIDE CONTROL OF LIGHTING.
- S y+ — AUTOMATIC SWITCHING/STEP-DIMMING DAYLIGHTING CONTROLLER USED TO SWITCH OFF LIGHTS WHEN SUFFICIENT NATURAL LIGHT IS PRESENT. REFER TO THE DLCS SOO FOR TARGET ILLUMINATION VALUE.
- D y+ — AUTOMATIC CONTINUOUS DIMMING DAYLIGHTING CONTROLLER USED TO DIM LIGHTS WHEN SUFFICIENT NATURAL LIGHT IS PRESENT. REFER TO THE DLCS SOO FOR TARGET ILLUMINATION VALUE.

LIGHTING CONTROL SYMBOL SUPERSCRIPT & SUBSCRIPT KEY:

1. "y" INDICATES THAT SWITCH LEG "y" TO BE CONFIGURED PER THE SOO. ADJACENT LOWER CASE LETTERS INDICATES QUANTITY OF SWITCHLEGS TO BE CONTROLLED. EXACT CONTROL FUNCTION IS DETERMINED BY THE BALLAST/DRIVER/FIXTURE TYPE.
2. ADJACENT UPPER CASE LETTER(S) INDICATE THE FOLLOWING:
   - AV INDICATES CONNECTION TO A/V CONTROL SYSTEM.
   - DM INDICATES DUAL MODE CONTROL AT CORRIDORS, STAIRWELLS AND WAREHOUSE AISLEWAYS
   - H INDICATES CONNECTION TO HVAC SYSTEM CONTROLS VIA CONTROLLED DRY-CONTACT CLOSURE.
   - K INDICATES LOCKING SWITCH FOR THE SUBSEQUENT LOWER CASE LETTER.
   - P INDICATES CONNECTION TO MOVEABLE PARTITION INTERFACE, SENSOR AND STATUS INDICATOR.
   - V INDICATES VANDAL RESISTANT SWITCH.
3. ADJACENT LOWER CASE LETTER(S) INDICATE SWITCH LEG(S) CONTROLLED EXCEPT WHERE "DM" INDICATES DUAL MODE CONTROL SWITCH.
4. ADJACENT "+, ++ AND *" INDICATES PORTION OF SWITCHLEG CONTROLLED BY SENSOR WHERE "+" INDICATES PRIMARY SIDELIT DAYLIT ZONE, "++" INDICATES SECONDARY SIDELIT DAYLIT ZONE, AND "*" INDICATES SKYLIT DAYLIT ZONE.

MISCELLANEOUS SYSTEM SYMBOLS

- ICP — INVERTER CONTROL PANEL. SEE INVERTER SPECIFICATIONS.
- IAP — INVERTER ANNUNCIATOR PANEL. SEE INVERTER SPECIFICATIONS.
- GAP — GENERATOR ANNUNCIATOR PANEL. SEE GENERATOR SYSTEM SPECIFICATIONS FOR MORE INFORMATION.
- IDCS — INTEGRATED DIMMING CONTROL STATION (IDCS) PANEL. WALL MOUNTED. SEE IDCS SYSTEM SPECIFICATIONS FOR MORE INFORMATION.
- DPCS — DIMMING PANEL CONTROL STATION (DPCS) PANEL. WALL MOUNTED. SEE DPCS SYSTEM SPECIFICATIONS FOR MORE INFORMATION.
- L — LIGHTING CONTROL SYSTEM LOCAL SWITCH. WALL MOUNTED. SEE LIGHTING CONTROL SYSTEM SPECIFICATIONS FOR MORE INFORMATION.
- O — LIGHTING CONTROL SYSTEM OVERRIDE SWITCH. WALL MOUNTED. SEE LIGHTING CONTROL SYSTEM SPECIFICATIONS FOR MORE INFORMATION.
- M — LIGHTING CONTROL SYSTEM MASTER SWITCH. WALL MOUNTED. SEE LIGHTING CONTROL SYSTEM SPECIFICATIONS FOR MORE INFORMATION.
- R — IDCS/DPCS SYSTEM REMOTE STATION SWITCH. WALL MOUNTED. SEE IDCS SYSTEM AND/OR DPCS SYSTEM SPECIFICATIONS FOR MORE INFORMATION.
- P — IDCS/DPCS SYSTEM PARTITION STATION SWITCH. WALL MOUNTED. SEE IDCS SYSTEM AND/OR DPCS SYSTEM SPECIFICATIONS FOR MORE INFORMATION.

BRANCH CIRCUIT SYMBOLS

- A-1,3,5 — HOME RUN TO PANEL. LETTER DESIGNATES PANEL, NUMBERS INDICATE CIRCUITS. HASH MARKS INDICATE NUMBER OF CONDUCTORS IN CONDUIT RUN, #12 AWG MINIMUM UNLESS OTHERWISE NOTED.
- A-1&3&5 — HOME RUN TO PANEL. LETTER DESIGNATES PANEL, NUMBERS INDICATE CIRCUITS WITH SEPARATE NEUTRALS. "&" INDICATES SEPARATE NEUTRALS.
- A-1+3+5 — HOME RUN TO PANEL. LETTER DESIGNATES PANEL, NUMBERS INDICATE CIRCUITS. "+" INDICATES SEPARATE #10 NEUTRAL THROUGHOUT BRANCH CIRCUIT. HASH MARK " " INDICATES AN ISOLATED GROUND CONDUCTOR.
- CONCEALED CONDUIT OR BRANCH CIRCUIT UNLESS OTHERWISE NOTED. 1/2" CONDUIT MINIMUM, (2) #12 AWG CONDUCTORS MINIMUM.
- CONDUIT OR BRANCH CIRCUIT CONCEALED BELOW GRADE, 3/4" CONDUIT MINIMUM WITH (2) #12 AWG CONDUCTORS MINIMUM AND A CODE SIZED EQUIPMENT GROUND.
- SURFACE-MOUNTED CONDUIT OR BRANCH CIRCUIT UNLESS OTHERWISE NOTED. 1/2" CONDUIT MINIMUM, (2) #12 AWG CONDUCTORS MINIMUM.
- TANDEM WIRING CONNECTION.
- CONDUIT STUB OUT, CAP, MARK AND RECORD ON AS-BUILT DRAWINGS.
- CONDUIT CONTINUATION.
- FLEXIBLE CONNECTION AS REQUIRED. NUMBER OF CONDUCTORS AS REQUIRED. VERIFY CONNECTION REQUIREMENTS WITH MANUFACTURER PRIOR TO ROUGH-IN.
- CONDUIT/BRANCH CIRCUIT/FEEDER CONTINUATION DOWN WALL TO FLOOR BELOW.
- CONDUIT/BRANCH CIRCUIT/FEEDER CONTINUATION UP WALL TO FLOOR ABOVE.

FLOOR BOX / SPECIALTY WALL BOX / PEDESTAL BOX SYMBOLS

- SINGLE SERVICE IN FLOOR BOX. PROVIDE DEVICES PER PLAN. SEE FLOOR BOX DETAILS AND SPECIFICATIONS FOR MORE INFORMATION.
- TWO SERVICE IN FLOOR BOX. PROVIDE DEVICES PER PLAN. SEE FLOOR BOX DETAILS AND SPECIFICATIONS FOR MORE INFORMATION.
- THREE SERVICE IN FLOOR BOX. PROVIDE DEVICES PER PLAN. SEE FLOOR BOX DETAILS AND SPECIFICATIONS FOR MORE INFORMATION.
- FOUR SERVICE IN FLOOR BOX. PROVIDE DEVICES PER PLAN. SEE FLOOR BOX DETAILS AND SPECIFICATIONS FOR MORE INFORMATION.
- SIX SERVICE IN FLOOR BOX. PROVIDE DEVICES PER PLAN. SEE FLOOR BOX DETAILS AND SPECIFICATIONS FOR MORE INFORMATION.
- AV — 7-GANG AV FLOOR BOX. PROVIDE DEVICES PER PLAN. SEE FLOOR BOX DETAILS AND SPECIFICATIONS FOR MORE INFORMATION.
- AV — RECESSED, ADJUSTABLE DEPTH, FLAT PANEL TV/DISPLAY WALL BOX WITH FLUSH GROMMETED COVER PANEL (CHIEF #PAC525F) AND MINIMUM OF (1) 1-1/4"C.O. FROM TOP-MOUNTED L.V. CONDUIT ENTRY BOX TO ACCESSIBLE CEILING. SEE PLANS FOR ANY ADDITIONAL CONDUIT REQUIREMENTS. PROVIDE ADDITIONAL L.V. AND LINE VOLTAGE CONDUIT ENTRY BOXES AS REQUIRED TO ACCOMPLISH WALL BOX CONFIGURATION DEPICTED ON PLANS. FLUSH GROMMETED COVER SHALL BE WHITE, BLACK OR CUSTOM COLOR PER ARCHITECT. WHEN FIELD CONDITIONS PROHIBIT INSTALLATION OF THIS DEVICE (SUCH AS WALL STUD/CAVITY DEPTH OF LESS THAN 2.5" ETC), CONFIRM VIA WRITTEN RFI THE INSTALLATION OF A TRADITIONAL POWER AND DATA RECEPTACLE INSTALLATION ALONG SIDE CCTV/AV JUNCTION BOX CONSISTING OF 2-GANG DEEP JUNCTION BOX/2-GANG RING WITH 1-1/4"C.O. TO ACCESSIBLE CEILING IN ADDITION TO ANY OTHER CONDUIT REQUIREMENTS DEPICTED ON PLANS. REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR MOUNTING HEIGHT.
- SINGLE OR DUAL SERVICE RECESSED EXTERIOR WALL BOX, TYPE "WP-A". PROVIDE DEVICES PER PLAN. EACH LV OR UNUSED COMPARTMENT SHALL BE EQUIPPED WITH A 1"C.O. TO THE NEAREST ACCESSIBLE CEILING SPACE U.O.N. SEE EXTERIOR DETAILS AND SPECIFICATIONS FOR MORE INFORMATION.
- SINGLE OR DUAL SERVICE EXTERIOR PEDESTAL, TYPE "WP-C". PROVIDE DEVICES PER PLAN. SEE EXTERIOR DETAILS AND SPECIFICATIONS FOR MORE INFORMATION. ARROW DENOTES DEVICE DOOR LOCATION.

ANNOTATIONS

- A — PANEL CALLOUT, "A" INDICATES PANELBOARD OR EQUIPMENT DESIGNATION.
- AC / 2 — MECHANICAL EQUIPMENT CALLOUT, "AC" INDICATES UNIT TYPE AND "2" INDICATES UNIT NUMBER. REFER TO MECHANICAL DRAWINGS FOR EXACT LOCATION AND ELECTRICAL REQUIREMENTS.
- 3 / E-1 — DETAIL CALLOUT, "3" INDICATES DETAIL NUMBER "E-1" INDICATES SHEET NUMBER.
- 2 — PLAN NOTE REFERENCE. REFER TO NOTES ON SHEET, OR AS DIRECTED.
- 2 — REVISION REFERENCE.
- WYE CONFIGURATION — DELTA CONFIGURATION — GROUND

POWER SYMBOLS

ALL RECEPTACLE OUTLETS SHOWN WITH A DIAGONAL SLASH SHALL BE CONTROLLED BY OCCUPANCY SENSOR OR LIGHTING CONTROL PANEL. SEE DISTRIBUTED LIGHTING CONTROLS FOR ADDITIONAL REQUIREMENTS. WHERE DOUBLE DUPLEX RECEPTACLE OUTLETS ARE INDICATED AS CONTROLLED, ONLY A SINGLE DUPLEX RECEPTACLE OUTLET (NON-IG, NON-GCFI TYPE) SHALL BE CONTROLLED. WITHIN ANY CONTROLLED DUPLEX RECEPTACLE OUTLET, ONLY ONE RECEPTACLE SHALL BE CONTROLLED. NOTE THAT FOR FLOOR BOXES OR POKE-THRU DEVICES, THE ASSOCIATED CONTROL RELAY MAY NEED TO BE LOCATED WITHIN THE ELECTRICAL ROOM WHERE THE CONTROLLED CIRCUIT ORIGINATES.

- R a — OCCUPANCY SENSOR/LIGHTING CONTROL SYSTEM CONTROLLED RECEPTACLE RELAY. WHERE LETTER DESIGNATION "a" REPRESENTS OCCUPANCY SENSOR/LIGHTING CONTROL SYSTEM CONTROL ZONE. SEE THE DISTRIBUTED LIGHTING CONTROL SPECIFICATION FOR MORE INFORMATION.
- DUPLEX RECEPTACLE, WALL MOUNTED.
- DOUBLE DUPLEX RECEPTACLE, WALL MOUNTED.
- DUPLEX, GFCI RECEPTACLE, WALL MOUNTED. WP INDICATES WEATHERPROOF, A, B OR C INDICATES THE TYPE OF COVER. REFER TO THE GENERAL PRODUCT SPECIFICATIONS.
- DOUBLE DUPLEX, WALL MOUNTED, WITH (1) GFCI RECEPTACLE AND (1) DUPLEX RECEPTACLE CONNECTED ON LOAD SIDE OF GFCI. WP INDICATES WEATHERPROOF, A, B OR C INDICATES THE TYPE OF COVER. REFER TO THE GENERAL PRODUCT SPECIFICATIONS.
- DUPLEX RECEPTACLE, ONE HALF SWITCHED, WALL MOUNTED.
- DUPLEX, ISOLATED GROUND RECEPTACLE, WALL MOUNTED.
- 1,3 / 1,3a — COMBINATION DOUBLE DUPLEX: ONE ISOLATED GROUND DUPLEX RECEPTACLE AND ONE DUPLEX RECEPTACLE, WALL MOUNTED.
- COMBINATION DOUBLE DUPLEX: TWO ISOLATED GROUND RECEPTACLES, WALL MOUNTED.
- SIMPLEX RECEPTACLE, WALL MOUNTED.
- SPECIAL RECEPTACLE, WALL MOUNTED. REFER TO PLAN NOTES.
- DUPLEX RECEPTACLE FLUSH IN CEILING. MOUNT FLUSH IN FLOOR WHEN INDICATED IN A FLOOR BOX SYMBOL.
- DOUBLE DUPLEX RECEPTACLE FLUSH IN CEILING. MOUNT FLUSH IN FLOOR WHEN INDICATED IN A FLOOR BOX SYMBOL.
- DUPLEX RECEPTACLE, ONE HALF SWITCHED, FLUSH IN CEILING. MOUNT FLUSH IN FLOOR WHEN INDICATED IN A FLOOR BOX SYMBOL.
- DUPLEX, ISOLATED GROUND RECEPTACLE, FLUSH IN CEILING. MOUNT FLUSH IN FLOOR WHEN INDICATED IN A FLOOR BOX SYMBOL.
- 1,3 / 1,3a — COMBINATION DOUBLE DUPLEX: ONE ISOLATED GROUND DUPLEX RECEPTACLE AND ONE DUPLEX RECEPTACLE, MOUNTED FLUSH IN CEILING. MOUNT FLUSH IN FLOOR WHEN INDICATED IN FLOOR BOX SYMBOL.
- COMBINATION DOUBLE DUPLEX FLUSH IN CEILING: TWO ISOLATED GROUND RECEPTACLES. MOUNT FLUSH IN FLOOR WHEN INDICATED IN FLOOR BOX SYMBOL.
- SIMPLEX RECEPTACLE FLUSH IN CEILING. MOUNT FLUSH IN FLOOR WHEN INDICATED IN A FLOOR BOX SYMBOL.
- SPECIAL RECEPTACLE FLUSH IN CEILING. MOUNT FLUSH IN FLOOR WHEN INDICATED IN A FLOOR BOX SYMBOL.
- DUPLEX RECEPTACLE, WALL MOUNTED AT 6-INCHES ABOVE COUNTER OR SPLASH.
- DOUBLE DUPLEX RECEPTACLE, WALL MOUNTED AT 6-INCHES ABOVE COUNTER OR SPLASH.
- DUPLEX, GFCI RECEPTACLE, WALL MOUNTED AT 6-INCHES ABOVE COUNTER OR SPLASH. WP INDICATES WEATHERPROOF, A, B OR C INDICATES THE TYPE OF COVER. REFER TO THE GENERAL PRODUCT SPECIFICATIONS.
- DOUBLE DUPLEX, WALL MOUNTED 6-INCHES ABOVE COUNTER OR SPLASH, WITH (1) GFCI RECEPTACLE AND (1) DUPLEX RECEPTACLE CONNECTED ON LOAD SIDE OF GFCI. WP INDICATES WEATHERPROOF, A, B OR C INDICATES THE TYPE OF COVER. REFER TO THE GENERAL PRODUCT SPECIFICATIONS.
- DUPLEX RECEPTACLE, BOTTOM HALF SWITCHED, WALL MOUNTED AT 6-INCHES ABOVE COUNTER OR SPLASH.
- DUPLEX, ISOLATED GROUND RECEPTACLE, WALL MOUNTED AT 6-INCHES ABOVE COUNTER OR SPLASH.
- 1,3 / 1,3a — COMBINATION DOUBLE DUPLEX: ONE ISOLATED GROUND DUPLEX RECEPTACLE AND ONE DUPLEX RECEPTACLE, WALL MOUNTED AT 6-INCHES ABOVE COUNTER OR SPLASH.
- COMBINATION DOUBLE DUPLEX: TWO ISOLATED GROUND DUPLEX RECEPTACLES, WALL MOUNTED AT 6-INCHES ABOVE COUNTER OR SPLASH.
- SIMPLEX RECEPTACLE, WALL MOUNTED AT 6-INCHES ABOVE COUNTER OR SPLASH.
- SPECIAL RECEPTACLE, WALL MOUNTED AT 6-INCHES ABOVE COUNTER OR SPLASH. REFER TO PLAN NOTES.
- WP-B — WET LOCATION-LISTED (RAINTITE-IN-USE) RECEPTACLE. SEE ELECTRICAL SPECIFICATION FOR ADDITIONAL INFORMATION.
- WP-D — DAMP LOCATION-LISTED (NOT-RAINTITE-IN-USE) RECEPTACLE. SEE ELECTRICAL SPECIFICATION FOR ADDITIONAL INFORMATION.
- DUPLEX RECEPTACLES WITH TWO 5V, 3.6A USB CHARGING PORTS. PROVIDE COLOR AS REQUIRED IN 15A OR 20A CONFIGURATION AND/OR TAMPER RESISTANT AND/OR HOSPITAL GRADE AS REQUIRED BY PLANS AND THE WIRING DEVICES SECTION OF THE GENERAL ELECTRICAL SPECIFICATIONS. (PASS & SEYMOUR OR EQUAL BY HUBBELL OR LEVITON.)
- QUAD RECEPTACLES WITH TWO 5V, 3.6A USB CHARGING PORTS. PROVIDE COLOR AS REQUIRED IN 15A OR 20A CONFIGURATION AND/OR TAMPER RESISTANT AND/OR HOSPITAL GRADE AS REQUIRED BY PLANS AND THE WIRING DEVICES SECTION OF THE GENERAL ELECTRICAL SPECIFICATIONS. (PASS & SEYMOUR OR EQUAL BY HUBBELL OR LEVITON.)
- J — JUNCTION BOX, WALL MOUNTED AT +18-INCHES A.F.F. OR AS NOTED. 4S/DP MINIMUM OR AS REQUIRED BY N.E.C., OR CEC, WHERE ADOPTED.
- J — JUNCTION BOX, MOUNTED IN ACCESSIBLE CEILING FOR APPLICATION DENOTED ON PLAN. 4S/DP MINIMUM OR AS REQUIRED BY N.E.C. OR CEC, WHERE ADOPTED.
- J — JUNCTION BOX, WALL MOUNTED AT 6-INCHES ABOVE COUNTER OR SPLASH. 4S/DP MINIMUM OR AS REQUIRED BY N.E.C., OR CEC, WHERE ADOPTED.
- J — JUNCTION BOX, 4S MINIMUM OR AS REQUIRED BY N.E.C., OR CEC, WHERE ADOPTED. MOUNTED IN ACCESSIBLE CEILING SPACE PER PLAN FOR FLEXIBLE CONNECTION TO PRE-WIRED FURNITURE SYSTEM. MOUNT FLUSH IN FLOOR WHEN INDICATED IN A FLOOR BOX SYMBOL. WHEN SHOWN WITH A DIAGONAL SLASH, THE LAST GENERAL RECEPTACLE CIRCUIT ON THE HOME-RUN CALL OUT SHALL BE CONTROLLED BY THE OCCUPANCY SENSOR. COORDINATE CONTROLLED CIRCUIT CONNECTION REQUIREMENTS WITH FURNITURE SYSTEM MANUFACTURER PRIOR TO ROUGH-IN. SEE DISTRIBUTED LIGHTING CONTROLS FOR ADDITIONAL REQUIREMENTS.
- J — JUNCTION BOX, WALL MOUNTED AT +18-INCHES A.F.F., 4S/DP MINIMUM OR AS REQUIRED BY N.E.C., OR CEC, WHERE ADOPTED, FOR FLEXIBLE CONNECTION TO PREWIRED FURNITURE SYSTEM. WHEN SHOWN WITH A DIAGONAL SLASH, THE LAST GENERAL RECEPTACLE CIRCUIT ON THE HOME-RUN CALLOUT SHALL BE CONTROLLED BY THE OCCUPANCY SENSOR. COORDINATE CONTROLLED CIRCUIT CONNECTION REQUIREMENTS WITH FURNITURE SYSTEM MANUFACTURER PRIOR TO ROUGH-IN. SEE DISTRIBUTED LIGHTING CONTROLS FOR ADDITIONAL REQUIREMENTS.
- SURFACE MOUNTED MULTI-OUTLET ASSEMBLY. REFER TO GENERAL PRODUCT SPECIFICATIONS. PROVIDE ALL COMPONENTS NECESSARY FOR A COMPLETE INSTALLATION.
- T — THERMOSTAT OUTLET BOX, PROVIDE 1/2" C.O. TO RESPECTIVE MECHANICAL UNIT.
- EXHAUST FAN, OR MOTOR LOAD. REFER TO MECHANICAL, PLUMBING OR KITCHEN DRAWINGS FOR SPECIFIC LOAD REQUIREMENTS OR AS NOTED.
- FLUSH MOUNTED ELECTRICAL PANELBOARD OR LOAD CENTER. REFER TO PANEL SCHEDULE.
- SURFACE MOUNTED ELECTRICAL PANELBOARD OR LOAD CENTER. REFER TO PANEL SCHEDULE.
- DISTRIBUTION SWITCHBOARD. REFER TO SINGLE LINE DIAGRAM.
- T — TRANSFORMER. REFER TO SINGLE LINE DIAGRAM.
- F — FUSED DISCONNECT SWITCH, HP RATED, OR COMBINATION MOTOR STARTER/DISCONNECT SWITCH WITH FUSES PER EQUIPMENT MANUFACTURER AND WEATHERPROOF AS REQUIRED. PROVIDE FINAL CONNECTION TO UNIT EQUIPMENT. SEE MOTORIZED EQUIPMENT SCHEDULE FOR DISCONNECT AND STARTER SIZES.
- NON-FUSED DISCONNECT SWITCH, HP RATED AND WEATHERPROOF AS REQUIRED. PROVIDE FINAL CONNECTION TO UNIT EQUIPMENT. SEE MOTORIZED EQUIPMENT SCHEDULE FOR DISCONNECT SIZES.
- M — UTILITY COMPANY METER. PROVIDE "CT's" AND "PT's" AS REQUIRED, REFER TO SINGLE LINE DIAGRAM.
- A B C — CIRCUIT BREAKER: "A" REPRESENTS CIRCUIT BREAKER AMPERE RATING, "B" REPRESENTS NUMBER OF POLES AND "C" REPRESENTS MISCELLANEOUS BREAKER FEATURES.
  - SHUNT= PROVIDE SHUNT TRIP MECHANISM
  - GFP= GROUND FAULT PROTECTION
  - CLCB= CURRENT LIMITING CIRCUIT BREAKER
  - SS= PROVIDE SOLID STATE CIRCUIT BREAKER
  - LO= PROVIDE PERMANENT LOCK-OPEN (OFF) HARDWARE
  - LC= PROVIDE PERMANENT LOCK-CLOSED (ON) HARDWARE
- A B C D — FUSIBLE SWITCH: "A" REPRESENTS SWITCH/FRAME AMPERE RATING, "B" REPRESENTS THE FUSE AMPERE RATING, "C" INDICATES NUMBER OF POLES AND "D" REPRESENTS MISCELLANEOUS FUSE/SWITCH FEATURES.
  - SHUNT= PROVIDE SHUNT TRIP MECHANISM
  - GFP= GROUND FAULT PROTECTION
  - CLF= CURRENT LIMITING FUSE
- GROUND CONNECTION, SIZE AS INDICATED OR AS REQUIRED.
- $a,b — SINGLE POLE SWITCHES, WALL MOUNTED. SUBSCRIPTS AT SYMBOL INDICATE THE FOLLOWING:

2 - DOUBLE POLE	LV - LOW VOLTAGE	RL - ROTARY LOCK KEY TYPE
3 - THREE WAY	P - PILOT LIGHT	PB - PUSHBUTTON
4 - FOUR WAY	R - REMOTE CONTROL	S - PROJECTION SCREEN
K - KEY OPERATED	M - MOTOR STARTING	

  a, b, c, ETC. - DESIGNATES QUANTITY OF SWITCHES AT EACH LOCATION.

  NOTE: ALL WALL SWITCHES CONTROLLING EMERGENCY CIRCUITS SHALL BE ENGRAVED WITH "EMERGENCY".
- EMERGENCY POWER OFF STATION, WALL MOUNTED PER EPO SYSTEM DETAIL.
- PB , OR P — PULLBOX, SIZED PER N.E.C. OR AS NOTED.

WALL MOUNTED DEVICE MOUNTING HEIGHT NOTE:

ALL WALL-MOUNTED EQUIPMENT MOUNTING HEIGHTS SHALL BE VERIFIED PRIOR TO ROUGH-IN PER REQUIREMENTS OF THE DEVICE ALIGNMENT AND MOUNTING HEIGHT DETAILS AND SPECIFICATIONS.

OWNER: Lodi Unified School District

PROJECT NAME: Bear Creek High School Agriculatural Science Bulding Inc. 2

CLIENT ADDRESS: 10555 THORTON RD., STOCKTON, CA 95209

REGISTERED PROFESSIONAL ENGINEER RAYMOND W. SWARTZ No. E15610 Ex. 12/31/2023 ELECTRICAL STATE OF CALIFORNIA

REVISIONS:

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PROJECT NO:	2022-40112
DATE ISSUED:	02.09.2023
SCALE:	None

E0.1a

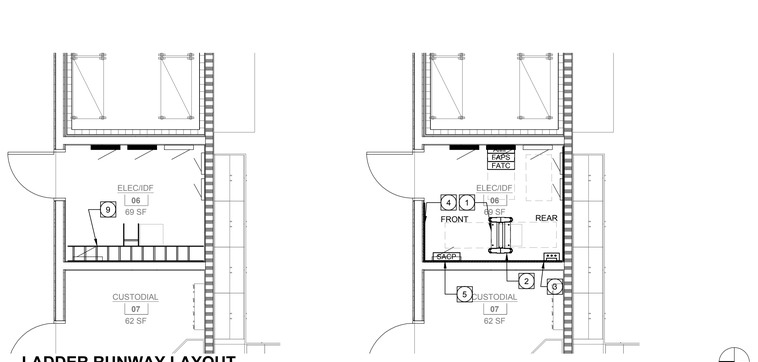
ELECTRICAL SYMBOLS LIST

tk1sc COLLABORATIVE
11870 Pierce Street, Suite 160
Riverside, California 92505
951.299.4160 www.tk1sc.com

Project Leader - Bill Voller
Electrical Lead - Nick Bruno
tk1sc Job #: B2202912.000

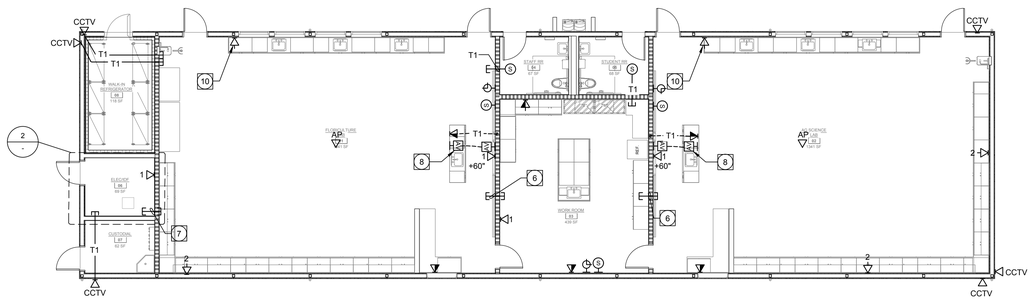
PLAN NOTES:

1. PROVIDE 2-POST EQUIPMENT RACK WITH ALL ASSOCAITED TERMINATION EQUIPMENT FOR OPTICAL FIBER CABLING, COPPER CABLING, PATCH PANELS, HORIZONTAL WIREMANAGERS. PROVIDE 120V/20A DEDICATED QUAD ELECTRICAL RECEPTACLE AT LADDER RUNWAY HEIGHT.
2. PROVIDE 4" WIDE VERTICAL WIREMANAGER ON EACH END OF THE 2-POST EQUIPMENT RACK.
3. PROVIDE TELECOMMUNICATIONS GROUNDING BUSBAR (TGB). ALL TELECOMMUNICATIONS EQUIPMENT, RACKS, LADDER RUNWAY, ETC SHALL BE BONDED AND GROUNDED.
4. 3/4" FIRE TREATED PLYWOOD. PLYWOOD SHALL BE APPLIED WITH WHITE FIRE-RETARDANT PAINT AND PRIMER. FIRE-RESISTANT STAMP SHALL BE VISIBLE FOR INSPECTOR APPROVAL.
5. SPACE RESERVED FOR SECURITY INTRUSION EQUIPMENT AND TERMINATIONS. INTRUSION SYSTEM BY OTHERS.
6. PROVIDE CONDUIT SLEEVES FOR ROUTING OF LOW VOLTAGE COMMUNICATIONS CABLING.
   3"C. DATA/TELEPHONE
   2"C. SECURITY
7. PROVIDE CONDUIT SLEEVES INTO THE TELECOM ROOM FOR ROUTING OF LOW VOLTAGE COMMUNICATIONS CABLING.
   (2)3"C. DATA/TELEPHONE
   2"C. SECURITY
8. PROVIDE HDMI CABLE AND CONNECTION FROM THE TEACHERS WORKSTATION TO BEHIND THE PROMETHEAN BOARD DISPLAY. PROVIDE CABLE IN 1-1/4" CONDUIT WITH 4-11/16 X 4-11/16 DEEP BACKBOX AND SINGLE GANG REDUCER.
9. PROVIDE 12" WIDE LADDER RUNWAY 6" ABOVE EQUIPMENT 2-POST RACK. PROVIDE ALL WALL ATTACHMENTS, RACK ATTACHMENT, AND BOND TO GROUND BUSBAR.
10. PROVIDE CONDUIT ONLY AT THIS LOCATION WITH BACK BOX AND BLANK FACEPLATE FOR FUTURE.



LADDER RUNWAY LAYOUT

ELECTRICAL/ TELECOM ROOM | 1/4" = 1'-0" | **2**



ELECTRICAL/SIGNAL PLAN | 1/8" = 1'-0" | **1**

COMMUNICATIONS PATHWAYS GENERAL NOTES:

1. CONDUITS SHALL (a) CONTAIN NO CONTINUOUS SECTIONS LONGER THAN 30M (98 FT.), AND (b) CONTAIN NO MORE THAN (2) 90° BENDS OR (1) REVERSE BEND WITHOUT INSTALLING A PULL BOX. SPLIT CONDUITS IN PLACE OF PULL BOXES ARE UNACCEPTABLE.
2. CONDUITS SHALL CONTAIN PLASTIC OR NYLON PULL TAPE RATED AT 200 LBS. WITH A MINIMUM OF 5 FEET OF EXTRA PULL TAPE COILED AT EACH END.
3. CONDUIT BEND RADIUS SHALL BE (a) A MINIMUM OF 6 TIMES THE INTERNAL CONDUIT DIAMETER FOR CONDUITS 2-INCHES IN DIAMETER OR LESS, AND (b) 10 TIMES THE INTERNAL CONDUIT DIAMETER FOR CONDUITS MORE THAN 2-INCHES IN DIAMETER.
4. TERMINATE CONDUIT STUBS AND SLEEVES THAT PROTRUDE THROUGH STRUCTURAL FLOORS 2-INCHEST TO 3-INCHES ABOVE THE FLOOR SURFACE.
5. INSTALL BUSHINGS OR BELL ENDS AS REQUIRED ON ALL CONDUITS.
6. FLEX CONDUIT IS UNACCEPTABLE FOR USE AS A COMMUNICATIONS CONDUIT EXCEPT AT SEISMIC JOINTS AND/OR IF APPROVED IN WRITING BY THE ENGINEER.
7. ALL UNDER SLAB OR IN-SLAB CONDUITS SHALL BE INSTALLED IN A MANNER THAT PREVENTS WATER INFILTRATION OF THE CONDUIT. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE GROUND WATER, RAIN WATER OR CONSTRUCTION WATER IS PREVENTED FROM ENTERING AND/OR REMOVED FROM THE CONDUITS PRIOR TO PLACEMENT OF COMMUNICATIONS CABLES. SEE ELECTRICAL SPECIFICATIONS, DETAILS AND PLANS FOR ADDITIONAL CONDUIT SEALING REQUIREMENTS.
8. ALL PULL BOXES SHALL BE SIZED AND INSTALLED PER ANSI-TIA-569-C. PULLBOXES FOR IN/UNDER SLAB CONDUIT RUNS ARE NOT PERMITTED UNLESS OTHERWISE NOTED. PULLBOXES FOR OVERHEAD CONDUIT RUNS SHALL BE LOCATED ABOVE ACCESSIBLE CEILINGS WITHIN THE ACCESSIBLE CEILING SPACE AND SUPPORTED INDEPENDENTLY FROM THE STRUCTURE AND CONDUIT SUPPORTS. PULLBOXES FOR ROOF MOUNTED OR EXTERIOR ABOVE GRADE APPLICATIONS SHALL BE NEMA 3R RATED. PULLBOXES SHALL BE SIZED ACCORDING TO THE FOLLOWING:

CONDUIT SIZE	WIDTH	LENGTH	DEPTH	WIDTH INCREASE PER ADDITIONAL CONDUIT
1"	4"	16"	3"	2"
2"	8"	36"	4"	5"
3"	12"	48"	5"	6"
4"	15"	60"	8"	8"

   FOR OTHER CONDUIT SIZES REFER TO ANSI/TIA-569-C TABLE 12. - LATEST PUBLISHED EDITION.
9. CONDUIT(S) SHALL EXIT A PULLBOX ON THE WALL OPPOSITE THE WALL ENTERED.
10. PROVIDE LABELING OF EACH CONDUIT PER GENERAL ELECTRICAL SPECIFICATIONS.
11. PROVIDE INTERNAL/EXTERNAL GAS AND WATER TIGHT MECHANICAL SEALING/PLUGGING OF EACH BUILDING ENTRY CONDUIT AS SPECIFIED ELSEWHERE IN THE DRAWINGS AND SPECIFICATIONS.

OWNER: Lodi Unified School District

PROJECT NAME: Bear Creek High School
Agriculatural Science Bulding Inc. 2

CLIENT ADDRESS: 10555 THORTON RD., STOCKTON, CA 95209

REGISTERED PROFESSIONAL ENGINEER
RAYMOND W. SWARTZ
No. E15610
Ex. 12/31/2023
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS:

	DESCRIPTION	DATE
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PROJECT NO: 2022-40112
DATE ISSUED: 02.09.2023
SCALE: As Indicated

E2.0

SIGNAL PLAN

tk1sc COLLABORATIVE
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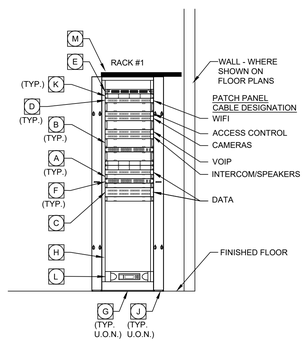
951.299.4160 www.tk1sc.com

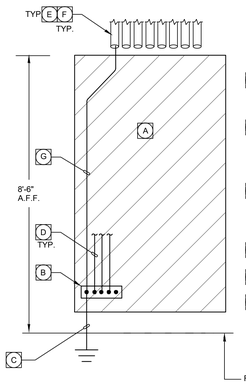
Project Leader - Bill Voller
Electrical Lead - Nick Bruno
tk1sc Job #: B2202912.000



IDF RACK EQUIPMENT ELEVATION

N.T.S.

10



BACKBOARD AND GROUNDING DETAIL NOTES:

A. WHITE ENAMEL PAINTED A/C GRADE FIRE RATED PLYWOOD TELECOM BACKBOARD, (8' HIGH x 3/4" THICK x WIDTH PER PLANS) BY E.C.. LEAVE ONE FIRE MARSHAL STAMP UNPAINTED ON EACH SHEET. MOUNT 6" ABOVE FINISHED FLOOR.
- ANCHOR TO METAL STUD WALL WITH #12 SMS SCREWS AT 16" ON CENTER.
- RECESS ALL SCREWS/BOLTS.

B. U.L. LISTED TELECOMMUNICATIONS GROUND BUS BAR (TMGB AND TGB). IN IDF AND MDF ROOMS PROVIDE TGB.

C. CONNECT TGB'S TO ELECTRICAL PANEL GROUND BUS WITH 3/4"C. AND #6AWG GROUND CONDUCTOR. ALL CONNECTIONS SHALL BE WITH 2-HOLE COMPRESSION LUGS.

D. INDIVIDUAL #6AWG GROUND CONDUCTORS TO EACH CABINET, RACK, LADDER TRAY, CONDUIT, ETC. BY SCS CONTRACTOR. CONNECT TO EQUIPMENT AND TO GROUND BUS BAR VIA 2-HOLE COMPRESSION LUGS ONLY. DAISY-CHAINING OF GROUND CONDUCTOR TO MORE THAN ONE PIECE OF EQUIPMENT IS PROHIBITED.

E. INCOMING FEED CONDUITS AND INNER-BUILDING CONDUITS. QUANTITY AND SIZE PER PLANS.

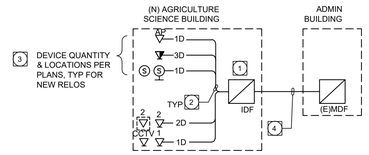
F. INNER-BUILDING CONDUITS AND SLEEVES. QUANTITY AND SIZE PER PLANS.

G. TELECOM BONDING BACKBONE CONDUCTOR BETWEEN TMGB AND ALL TGB'S. REFER TO SITE AND FLOOR PLANS FOR MORE INFORMATION.

TELECOM BACKBOARD AND GROUND BUS BAR

N.T.S.

8



3 DEVICE QUANTITY & LOCATIONS PER PLANS, TYP FOR NEW RELOS

LAN VOIP WAP SYSTEM KEY NOTES:

1. PROVIDE IDF WALL MOUNTED CABINET. PROVIDE FIBER ENCLOSURE, PATCH PANEL, WIRE MANAGERS, ETC FOR CABLING TERMINATION.
2. CATEGORY-6A UTP 4-PAIR CABLE PER DISTRICT STANDARDS. CABLE QUANTITIES AT EACH DEVICE PER PLAN DRAWINGS. TERMINATE ON FACEPLATE AT DEVICE LOCATION AND ON CATEGORY-6A RACK MOUNTED PATCH PANEL(S) IN IDF CABINET.
3. DEVICES PER SYMBOLS LIST AND FACEPLATE DETAILS. QUANTITY AND LOCATIONS PER PLAN DRAWINGS. REFER TO DISTRICT STANDARDS FOR ADDITIONAL REQUIREMENTS.
4. 12 STRAND OS2 OSP SINGLEMODE FIBER OPTIC CABLING FROM MDF TO IDF CABINET.

CABLE SCHEDULE

DESIGNATOR	CABLE QUANTITY AND TYPE
1D	(1) CATEGORY-6A UTP 4-PR
2D	(2) CATEGORY-6A UTP 4-PR
3D	(3) CATEGORY-6A UTP 4-PR

GENERAL NOTES:

1. REFERENCE DISTRICT SPECIFICATIONS AND STANDARDS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

STRUCTURED CABLING SYSTEMS BLOCK DIAGRAM

N.T.S.

4

FACEPLATE AND DETAIL NOTES

1. PROVIDE (1) CATEGORY-6A, 4-PAIR, UTP CABLE(S) TO IDF ROOM RACK. COLOR PER SPECIFICATIONS. TERMINATE STATION END(S) IN STATION CONNECTOR(S) PER DETAILS. TERMINATE IDF RACK/CABINET END(S) ON CATEGORY-6A PATCH PANEL(S).
2. PROVIDE CATEGORY-6A STATION CONNECTOR. COLOR OF CONNECTOR PER SPECIFICATIONS.
3. PROVIDE FACEPLATE. FACEPLATE MATERIAL AND FINISH SHALL MATCH ADJACENT/NEARBY POWER FACEPLATES UNLESS OTHERWISE NOTED.
4. PROVIDE FACEPLATE LABELING PER DISTRICT STANDARDS.
5. BLANK INSERT. ALL UNUSED FACEPLATE OPENINGS SHALL BE COVERED WITH A BLANK INSERT MATCHING THE COLOR OF THE FACEPLATE.
6. PROVIDE COVERPLATE PER SPECIFICATIONS. COVERPLATE MATERIAL AND FINISH SHALL MATCH ADJACENT/NEARBY POWER COVERPLATES. PROVIDE FLOOR BOX AS REQUIRED FOR A COMPLETE INSTALLATION. INCLUDE ALL COSTS IN BASE BID.
7. PROVIDE J-HOOK ABOVE ACCESSIBLE CEILING PER SPECIFICATIONS. J-HOOKS SHALL BE SPACED AT A MAXIMUM OF 5 FEET APART.
8. PROVIDE (1) SURFACE-MOUNT PLENUM-RATED TWO-PORT HOUSING. MOUNT TO CONTRACTOR-PROVIDED IN-CEILING BRACKET WITH MULTI-FUNCTION CLIP FOR ROD OR HANGER WIRE MOUNTING. PROVIDE 15FT SLACK LOOP ON J-HOOK MOUNTED ABOVE HOUSINGS. MOUNT HOUSING 10 TO 12 INCHES ABOVE ACCESSIBLE CEILING TILE.
9. INSTALL DEDICATED SUSPENDED CEILING WIRE/HANGER OR SUPPORT ROD/ROD HANGER DIRECTLY TO STRUCTURAL CEILING ABOVE TO SUPPORT WAP SURFACE MOUNT HOUSING.

RACK ELEVATION NOTES:

A. (1) EA. RACK MOUNTED 1U WIRE MANAGEMENT PANELS (DOUBLE SIDED).

B. (1) EA. RACK MOUNTED 2U WIRE MANAGEMENT PANELS (DOUBLE SIDED).

C. 48-PORT CATEGORY 6A MODULAR PATCH PANEL PER DISTRICT SPECIFICATIONS. EACH PANEL SHALL INCLUDE (2) REAR CABLE STRAIN RELIEF/MANAGEMENT BARS. QUANTITY AS REQUIRED TO TERMINATE ALL CAT-6A CABLES. SEE SPECIFICATIONS FOR MORE INFORMATION.

D. 24-PORT CATEGORY 6A MODULAR PATCH PANEL PER DISTRICT SPECIFICATIONS. EACH PANEL SHALL INCLUDE (2) REAR CABLE STRAIN RELIEF/MANAGEMENT BARS. QUANTITY AS REQUIRED TO TERMINATE ALL CAT-6A CABLES. SEE SPECIFICATIONS FOR MORE INFORMATION.

E. FIBER OPTIC ENCLOSURE COMPLETE PER SPECIFICATIONS. SCS CONTRACTOR TO TERMINATE FIBER STRANDS AS SPECIFIED.

F. OWNER PROVIDED AND INSTALLED EQUIPMENT.

G. THE SCS CONTRACTOR SHALL INSTALL ALL PATCH CORDS PER OWNER'S REQUIREMENTS.

H. FLOOR MOUNTED 7' 2-POST RACK. PROVIDE COMPLETE WITH ALL REQUIRED FLOOR MOUNTING HARDWARE.

J. RACK MOUNTED 7' VERTICAL WIRE MANAGEMENT CHANNEL (4") WITH COVERS. PROVIDE VELCRO STRAPS AS REQUIRED TO MAINTAIN CABLE BUNDLES, PROVIDE RACK RADIUS DROPS WITH VERTICAL WIRE MANAGER.

K. 1RU RACK FILLER PANEL

L. RACK MOUNTED UNINTERRUPTED POWER SUPPLY (UPS).

M. U.L.-CLASSFIED LADDER TRAY/CABLE RUNWAY. 12"-WIDE AS NOTED ON FLOOR PLANS. LENGTH AND WIDTH AS SHOWN ON IDF FLOOR PLANS.

LADDER TRAY SCHEDULE

CABLE TRAY STYLE	TRAY WIDTH	SIDE RAIL HEIGHT	RUNG SPACING	LOAD DEPTH	RADIUSED FITTINGS INSIDE BEND RADIUS	SYSTEM LOAD	TRAY COLOR	REMARKS
LADDER	12"	1-1/2"	9"	NA	NA	40 LBS/LF	BLACK	LENGTH PER PLANS

LADDER TRAY SPECIFICATIONS:

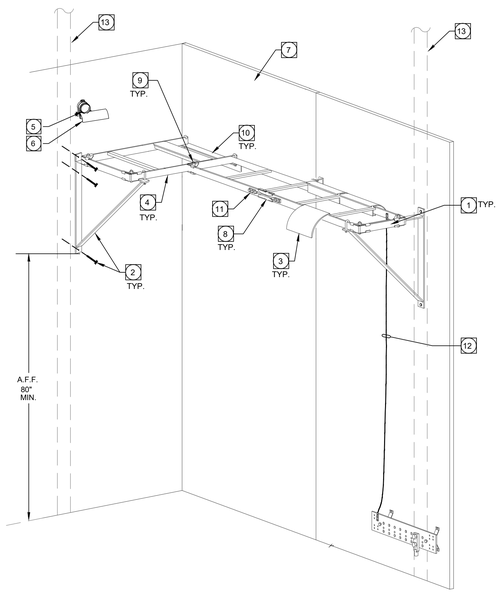
1. CABLE TRAY DESIGN
U.L. LISTED LADDER TRAY SYSTEM SHALL BE MADE OF STRAIGHT SECTIONS, FITTINGS, AND ALL ACCESSORIES. STANDARD LADDER TRAYS SHALL BE U.L. CLASSIFIED AS EQUIPMENT GROUNDING CONDUCTORS.
2. CABLE TRAY MATERIALS
STRAIGHT SECTIONS SHALL BE CONSTRUCTED OF 3/8" X 1-1/2" X .065 WALL RECTANGULAR STEEL TUBING. CROSS MEMBERS SHALL BE CONSTRUCTED OF 1/2" X 1" X .065" RECTANGULAR STEEL TUBING AND WELDED AT 9" INTERVALS.
3. CABLE TRAY SEISMIC BRACING REQUIREMENTS
LADDER TRAY SYSTEM LOCATED IN SEISMIC DESIGN CATEGORY C, D, E OR F AS DEFINED BY THE CALIFORNIA BUILDING CODE SHALL BE SUPPORTED AND BRACED IN ACCORDANCE WITH THE CALIFORNIA BUILDING CODE AND.
4. LADDER TRAY FITTINGS AND ACCESSORIES
ALL FITTINGS ACCESSORIES SHALL BE FURNISHED AS REQUIRED TO PROTECT, SUPPORT AND INSTALL A COMPLETE LADDER TRAY SYSTEM.
5. LADDER TRAY ROUTING REQUIREMENTS
LADDER TRAY SHALL BE ROUTED AROUND OBSTRUCTIONS AS REQUIRED, BUT IN NO CASE SHALL TRAY PREVENT REMOVAL OF CEILING TILES OR PANELS, NOR BLOCK ACCESS TO ELECTRICAL, PLUMBING OR MECHANICAL EQUIPMENT.
6. LADDER TRAY SEPARATION REQUIREMENTS
TRAY USED FOR SUPPORTING COMMUNICATION CABLING SHALL BE SEPARATED FROM ANY ELECTRICAL BRANCH CIRCUIT BY 3" AND ANY ELECTRICAL FEEDER BY 18".
7. THIS DETAIL IS GENERIC IN NATURE AND IS INTENDED TO DEPICT A VARIETY OF LADDER TRAY INSTALLATION SCENARIOS - NOT ALL OF WHICH APPLY TO A GIVEN PROJECT. IT IS THE CONTRACTOR'S RESPONSIBILITY TO EXAMINE ALL PROJECT PLANS AND PROVIDE A LADDER TRAY INSTALLATION APPROPRIATE TO THE SITUATION, UTILIZING PORTIONS OF THIS DETAIL AS APPLICABLE, THAT RESULT IN NEAT WORKMANSHIP AND COMPLY WITH ANSI/EIA/TIA STANDARDS.
8. FIRE STOPPING REQUIREMENTS
FIRE STOPPING OF THRU PENETRATIONS WHERE THE TRAY OR ITS CONTENTS PENETRATE A FIRE RATED WALL, FLOOR, ETC., SHALL BE ACCOMPLISHED BY THE E.C. UTILIZING U.L. LISTED FIRE STOPPING METHODS. E.C. SHALL VERIFY TYPES/QUANTITIES OF CABLES TO BE UTILIZED BY THE OWNER AT EACH THRU PENETRATION CONDITION AND PROVIDE A SUITABLE REENTERABLE FIRESTOP SYSTEM LISTED FOR EACH FIRESTOP CONDITION.
9. RADIUS CABLE DROPS
PROVIDE RADIUS CABLE DROPOUT(S) MEETING EIA/TIA CABLE BENDING CRITERIA AT TRAY STOPPING POINT WITHIN A TELECOMMUNICATIONS CLOSET OR ANY DISCONTINUITY IN TRAY PATH.
10. LADDER TRAY COORDINATION REQUIREMENTS
CONTRACTOR SHALL COORDINATE TRAY SYSTEM INSTALLATION WITH ALL TRADES PRIOR TO ORDERING AND AGAIN PRIOR TO INSTALLING TRAY SYSTEM.
11. LADDER TRAY LOADING CAPACITIES
INSTALLED LADDER TRAY SHALL SUPPORT SYSTEM LOAD AS DEFINED IN LADDER TRAY SCHEDULE.
12. LADDER TRAY MANUFACTURERS
MANUFACTURED BY CHATSWORTH OR EQUAL BY COOPER B-LINE, CABLOFIL.

LADDER TRAY INSTALLATION REQUIREMENTS:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FURNISHING OF ALL MATERIAL, LABOR, EQUIPMENT, AND SERVICES, IN CONNECTION WITH THE INSTALLATION OF A COMPLETE AND FULLY FUNCTIONING AND CODE COMPLIANT INSTALLATION.
2. IT IS THE INTENT OF THE CONTRACT DOCUMENTS, WHICH ARE PRESENTED IN A DIAGRAMMATIC FORMAT, TO PROVIDE CONTRACTOR INFORMATION THAT SUPPLEMENTS AND ENHANCES THE GENERALLY ACCEPTED CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES EMPLOYED IN CONNECTION WITH INSTALLATION OF THIS TYPE OF PRODUCT / SYSTEM.
3. THE CONTRACTOR SHALL ALSO INCORPORATE THE REQUIREMENTS OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS / WARRANTY REQUIREMENTS AS PART OF THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS. IN THE EVENT OF A CONFLICT BETWEEN THE CONTRACT DOCUMENT REQUIREMENTS AND THE MANUFACTURER'S INSTALLATION REQUIREMENTS, THE MORE STRINGENT REQUIREMENTS SHALL APPLY - UNLESS THE MORE STRINGENT REQUIREMENT VOIDS APPLICABLE WARRANTIES OR VIOLATES THE REQUIREMENTS OF THE LOCAL AUTHORITY HAVING JURISDICTION. ANY SUCH CONFLICT SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE ENGINEER IN WRITING THROUGH THE FORMAL RFI PROCESS.
4. REFER TO THE ASSOCIATED SCHEDULES, SCHEMATICS, DRAWINGS, AND SPECIFICATIONS FOR DETAILED INFORMATION / REQUIREMENTS ON THIS PRODUCT / SYSTEM.

LADDER TRAY NOTES:

1. END CLOSING KIT. LADDER TRAY TERMINATIONS NOT ADJACENT TO A WALL OR JUNCTION SHALL BE COVERED BY AN END CLOSING KIT OR PROTECTIVE GROMMETS.
2. TRIANGULAR SUPPORT BRACKET WITH (3) 1/4" DIAMETER TEK METAL-TO-WOOD SCREWS AT EACH BRACKET TO ATTACH TO METAL STUD BACKING. REQUIRED IN EVERY TRIANGLE SUPPORT BRACKET. PROVIDE TRIANGLE SUPPORT BRACKET AT 4' INTERVALS.
3. CABLE DROPOUTS SHALL BE USED WHEREVER CABLES LEAVE LADDER TRAY.
4. LADDER TRAY. SIZE AND LENGTH PER PLANS.
5. FIREWALL PENETRATION SLEEVE(S) WITH BUSHINGS BY E.C. SIZE AND QUANTITY PER PLANS. SCS CONTRACTOR TO FIRESEAL INSIDE OF SLEEVE AFTER CABLE INSTALLATION.
6. CABLE SPILLWAY/WATERFALL. TYPICAL AT ALL CONDUITS, INCOMING CABLE TRAY, OR FIREWALL PENETRATIONS.
7. PLYWOOD BACKBOARD OR WALL.
8. BUTT SPLICE.
9. JUNCTION SPLICE.
10. WALL ANGLE SUPPORT KIT.
11. SPLICE/JUNCTION GROUNDING KIT SHALL BE USED TO BOND SECTIONS OF TRAY TOGETHER FOR GROUNDING PURPOSES.
12. LADDER TRAY SHALL BE GROUNDED TO BUSBAR WITH #6 AWG SOLID WIRE WITH GREEN INSULATION AND (2) HOLE GROUNDING LUG.
13. WALL STUD.



LADDER RUNWAY SYSTEM DETAIL

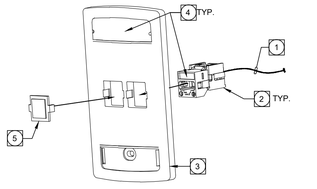
N.T.S.

9

WHERE THE FOLLOWING SYMBOLS ARE INDICATED ON THE ELECTRICAL DRAWINGS ARCHITECTURAL DRAWINGS AND/OR STRUCTURED CABLING SYSTEM DRAWINGS:

1

THE FOLLOWING SHALL BE PROVIDED, AS DEPICTED IN THE FOLLOWING DIAGRAMMATIC CONNECTIVITY DETAIL.



DATA DEVICE - 1-PORT

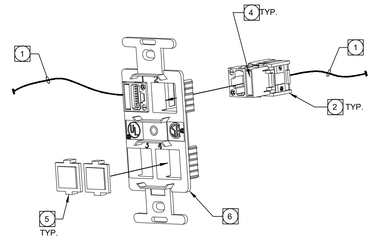
N.T.S.

5

WHERE THE FOLLOWING SYMBOLS ARE INDICATED ON THE ELECTRICAL DRAWINGS ARCHITECTURAL DRAWINGS AND/OR STRUCTURED CABLING SYSTEM DRAWINGS:

2

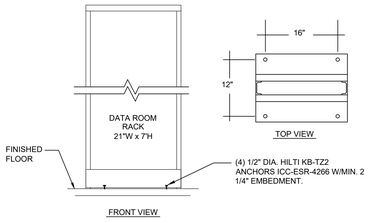
THE FOLLOWING SHALL BE PROVIDED, AS DEPICTED IN THE FOLLOWING DIAGRAMMATIC CONNECTIVITY DETAIL.



FLOOR BOX DATA DEVICE - 2-PORT

N.T.S.

6



NOTE: MAXIMUM EQUIPMENT WEIGHT - 1000lbs

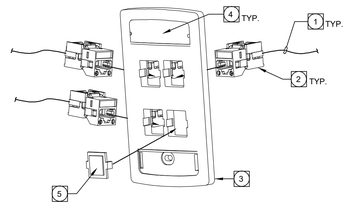
DATA RACK FLOOR-MOUNT DETAIL

N.T.S.

7

WHERE THE FOLLOWING SYMBOLS ARE INDICATED ON THE ELECTRICAL DRAWINGS ARCHITECTURAL DRAWINGS AND/OR SIGNAL SYSTEM DRAWINGS:

THE FOLLOWING SHALL BE PROVIDED, AS DEPICTED IN THE FOLLOWING DIAGRAMMATIC CONNECTIVITY DETAIL.



VOIP TELEPHONE AND DATA DEVICE

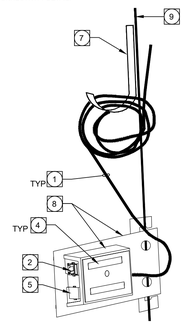
N.T.S.

1

WHERE THE FOLLOWING SYMBOLS ARE INDICATED ON THE ELECTRICAL DRAWINGS ARCHITECTURAL DRAWINGS AND/OR SIGNAL SYSTEM DRAWINGS:

AP

THE FOLLOWING SHALL BE PROVIDED, AS DEPICTED IN THE FOLLOWING DIAGRAMMATIC CONNECTIVITY DETAIL.



INDOOR WIRELESS ACCESS POINT DEVICE

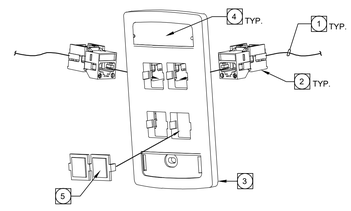
N.T.S.

2

WHERE THE FOLLOWING SYMBOLS ARE INDICATED ON THE ELECTRICAL DRAWINGS ARCHITECTURAL DRAWINGS AND/OR SIGNAL SYSTEM DRAWINGS:

2 3

THE FOLLOWING SHALL BE PROVIDED, AS DEPICTED IN THE FOLLOWING DIAGRAMMATIC CONNECTIVITY DETAIL.



DATA DEVICE - 2-PORT

N.T.S.

3

OWNER: Lodi Unified School District

PROJECT NAME: Bear Creek High School Agriculatural Science Bulding Inc. 2

CLIENT ADDRESS: 10555 THORTON RD., STOCKTON, CA 95209

REGISTERED PROFESSIONAL ENGINEER RAYMOND W. SIMPSON E15610 11/30/2023 ELECTRICAL STATE OF CALIFORNIA

REVISIONS:

	DESCRIPTION	DATE

PROJECT NO: 2022-40112

DATE ISSUED: 02.09.2023

SCALE: AS NOTED

E4.1

TECHNOLOGY DETAILS

tk1sc COLLABORATIVE
11870 Pierce Street, Suite 160
Riverside, California 92505
951.299.4160 www.tk1sc.com

Project Leader - Bill Voller
Electrical Lead - Nick Bruno
tk1sc Job #: B220291Z.000

FIRE ALARM GENERAL NOTES

1. WALL MOUNTED, AUDIBLE NOTIFICATION DEVICES SHALL HAVE THEIR TOPS MOUNTED AT 90" MINIMUM AND 100" MAXIMUM ABOVE THE FINISHED FLOOR, AND NO CLOSER THAN 6" TO A HORIZONTAL STRUCTURE. (NFPA 72, SECTION 18.4.8.1). ALL WALL MOUNTED VISUAL APPLIANCES AND COMBINATION AUDIBLE/VISUAL APPLIANCES SHALL HAVE THEIR BOTTOMS MOUNTED AT 80" MINIMUM AND 96" MAXIMUM ABOVE FINISHED FLOOR AS MEASURED TO THE LENS. (NFPA 72, SECTION 18.5.5.1)
2. ALL EQUIPMENT SHALL BE U.L. AND CSFM LISTED.
3. ALL FIRE ALARM WIRING SHALL BE FLP (FIRE POWER LIMITED) OR FPLP (FIRE POWER LIMITED PLENUM) AS REQUIRED FOR APPLICATION. WIRING IN CONDUIT ABOVE GROUND MAY BE THHN OR THWN.
4. PER THE CEC, ALL WIRING IS TO BE PULLED THROUGH EACH JUNCTION BOX AND CONNECTED DIRECTLY TO EACH FIRE DEVICE. DO NOT SPLICE THE WIRE. THERE MUST BE AT LEAST 6' OF LEAD WIRE FROM THE BOX TO THE DEVICE. ALL BOXES TO BE SIZED PER CEC AND SHALL HAVE THEIR COVERS PAINTED RED WHERE APPLICABLE.
5. DO NOT DEVIATE FROM CONDUIT RUNS AS SHOWN ON FLOOR PLANS WITHOUT PRIOR APPROVAL FROM ELECTRICAL ENGINEER. FACTORS SUCH AS EXCESSIVE VOLTAGE DROP, ADDITIONAL PARTS, ENGINEERING, ETC., THAT ARE A RESULT OF CONDUIT RUN DEVIATIONS SHALL BE THE SOLE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.
6. ALL FAN SHUTDOWN FUNCTIONS, DAMPER CLOSURES AND ASSOCIATED MECHANICAL SYSTEM FIRE ALARM INTERFACE SHALL BE BY MECHANICAL CONTRACTOR, AND SHALL BE COORDINATED WITH FIRE ALARM SYSTEM.
7. ALL DUCT SMOKE DETECTORS SHALL BE MOUNTED BY THE MECHANICAL CONTRACTOR. DUCT SMOKE DETECTORS EXPOSED TO THE WEATHER SHALL BE C.S.F.M. LISTED FOR OUTDOOR INSTALLATION, AND WEATHER PROTECTED BY THE MECHANICAL CONTRACTOR. ALL AIR VELOCITY TESTING SHALL BE PERFORMED BY THE MECHANICAL CONTRACTOR.
8. ALL FIRE ALARM DEVICE BACKBOXES, FIRE ALARM TERMINAL CABINETS, GUTTERS, JUNCTION BOXES AND ASSOCIATED CONDUITS SHALL BE FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR UNLESS OTHERWISE NOTED. REFER TO FIRE ALARM SYMBOL LIST AND/OR MOUNTING DETAILS FOR ADDITIONAL INFORMATION. SYSTEM SUPPLIER PROVIDED BACKBOXES SHALL BE INSTALLED BY ELECTRICAL CONTRACTOR UNLESS OTHERWISE NOTED.
9. SMOKE DETECTOR TESTING SHALL BE PERFORMED TO ENSURE THAT EACH DETECTOR IS WITHIN ITS LISTED AND MARKED SENSITIVITY RANGE USING THE METHODS RECOMMENDED PER CFC, SECTION 907.8.4 AND NFPA 72, SECTION 14.4.4.3.4.
10. ALL WIRING, INITIATING DEVICES AND ANNUNCIATOR PANEL SHALL BE SUPERVISED TO THE PRINCIPAL POINT OF ANNUNCIATION. THE FIRE ALARM CONTROL PANEL TO SUPERVISE THE ANNUNCIATOR PANEL, ALL INITIATING AND INDICATING DEVICE CIRCUITS.
    A. INITIATING DEVICE CIRCUITS (IDC): CLASS B
    B. SIGNALING LINE CIRCUITS (SLC): CLASS B
    C. NOTIFICATION APPLIANCE CIRCUITS (NAC): CLASS B
11. ALL WIRING SHALL BE CUT FOR IN AND OUT. WIRING SHALL NOT BE LOOPED THROUGH DEVICES.
12. POINT AND COMMON ANNUNCIATION AND T-TAPPING ARE PROHIBITED. (T-TAPPING IS ALLOWABLE ON STYLE 4 SLC LOOPS).
13. PROVIDE 3/4" CONDUIT FROM FIRE ALARM CONTROL PANEL TO TELEPHONE BACKBOARD FOR OWNER PROVIDED CENTRAL STATION MONITORING.
14. CONTRACTOR TO FIELD VERIFY AND PROVIDE DECIBEL METER FOR TESTING OF AMBIENT NOISE LEVELS AUDIBLE DEVICES TO BE AT LEAST 15 DBA ABOVE THE AVERAGE AMBIENT SOUND LEVEL BUT NOT LESS THAN 75 DBA AT 10 FEET OR 5 DBA ABOVE THE MAXIMUM SOUND LEVEL BUT NOT MORE THAN 110 DBA AT THE MINIMUM HEARING DISTANCE. SOUND LEVEL SHALL BE MAINTAINED FOR DURATION OF AT LEAST 60 SECONDS (CFC, SECTION 907.5.2.1.1). THE CONTRACTOR SHALL ADJUST/INSTALL ALL DEVICES TO MAXIMIZE PERFORMANCE AND TO MINIMIZE FALSE ALARMS. PROVIDE UPDATED PLANS AND CALCULATIONS THROUGH THE "CHANGE ORDER" PROCESS WHEN INSTALLING ADDITIONAL DEVICES.
15. VISUAL DEVICES SHOULD NOT EXCEED 2 FLASHES PER SECOND AND SHOULD NOT BE SLOWER THAN 1 FLASH EVERY SECOND. THE DEVICE SHALL HAVE A PULSING LIGHT SOURCE NOT LESS THAN 15-CANDELA. VISUAL DEVICES WITHIN 55' FROM EACH OTHER SHALL BE SYNCHRONIZED.
16. ALL FIRE ALARM CIRCUITS SHALL BE IN CONDUIT, APPROVED SURFACE RACEWAY OR OPEN RUN ABOVE CEILINGS, UNDER FLOORS AND IN WALLS IN A NEAT AND PROTECTED MANNER AS INDICATED ON THE DESIGN DOCUMENTS. EXPOSED CIRCUITS ARE ONLY PERMITTED WHEN NOTED AS EXPOSED ON DESIGN DOCUMENTS. ALL CONDUITS SHALL BE 3/4" MINIMUM. CONTRACTOR TO VERIFY CONDUIT FILL PRIOR TO INSTALLATION.
17. ALL FLOW SWITCHES SHALL BE 2 WIRE WITH NON-ELECTRONIC RETARD TYPE SIMILAR TO THE SYSTEM SENSOR MODEL "WFD SERIES" ONLY.
18. ALL DEVICES IN THE ALARM SYSTEM SHALL BE COMPATIBLE AND INSTALLED PER MANUFACTURER'S SPECIFICATIONS.
19. SYSTEM SHALL BE FURNISHED AND INSTALLED BY AN AUTHORIZED DISTRIBUTOR.
20. FIRE ALARM SYSTEM INSTALLATION COMPANY SHALL BE UL LISTED (UUJS).
21. FIRE ALARM PANEL, REMOTES, AND COMPONENTS SHALL BE SECURED TO MOUNTING SURFACES PER MANUFACTURER'S SPECIFICATIONS. NO SINGLE DEVICE SHALL EXCEED THE WEIGHT OF 20 LBS. WITHOUT SPECIAL MOUNTING DETAILS.
22. SMOKE DETECTOR SHALL NOT BE ANY CLOSER THAN 1 FOOT FROM FIRE SPRINKLERS OR 3 FEET FROM ANY SUPPLY DIFFUSER. IN THE AREA OF CONSTRUCTION OR WHERE POSSIBLE DAMAGE/CONTANMINATION COULD OCCUR ON NEWLY INSTALLED FIRE ALARM DEVICES, DEVICES SHALL BE COVERED UNTIL THAT AREA IS READY TO BE TURNED OVER TO THE OWNER. DETECTORS THAT HAVE BEEN INSTALLED PRIOR TO FINAL CLEAN-UP BY ALL TRADES SHALL BE CLEANED OR REPLACED IN ACCORDANCE WITH CFC, SECTION 907. CLEANING OR REPLACEMENT OF DEVICES THAT WERE MOUNTED AT THE REQUEST OF THE CONTRACTOR WILL NOT BE PERFORMED WITHOUT WRITTEN AUTHORIZATION THAT ASSUMES FINANCIAL RESPONSIBILITY FOR COSTS INCURRED. TESTING OF DETECTORS SHALL BE PERFORMED PER NFPA 72, SECTION 14.4.5.3 AND CFC, SECTION 907.8.4.
23. PER CBC, SECTION 11B-309 ACTIVATION OF INITIATING DEVICE SHALL NOT REQUIRE MORE THAN 5 LBS. (22.2N) OF FORCE OR REQUIRE TIGHT GRASPING PINCHING, OR TWISTING OF WRIST.
24. THE SYSTEM SHALL CONFORM TO CALIFORNIA CODE OF REGULATIONS (CCR) TITLES 19 AND 24 AS APPLICABLE TO THIS PROJECT.
25. THE VOICE/ALARM COMMUNICATION SYSTEM VOICE MESSAGE SHALL COMPLY WITH NFPA 72, SECTIONS 18.4 AND 24.4 FOR GENERAL REQUIREMENTS, INTELLIGIBILITY, AUDIBILITY, MESSAGE PRIORITY, TONES, ETC.
26. A DEDICATED 120V BRANCH CIRCUIT SHALL BE PROVIDED FOR FIRE ALARM EQUIPMENT. THIS CIRCUIT SHALL BE ENERGIZED FROM THE COMMON USE AREA PANEL AND SHALL HAVE NO OTHER OUTLETS. PROVIDE A LABEL WITHIN THE FACP AND EACH POWER SUPPPLY WITH THE PANEL NUMBER AND CIRCUIT NUMBER OF THE 120 VOLT POWER SOURCE. THE BREAKER SHALL HAVE A RED LOCKING DEVICE TO BLOCK THE HANDLE IN THE "ON" POSITION AND BE LABELED AS FOLLOWS:
    A. "FIRE ALARM" FOR FIRE ALARM SYSTEMS.
    B. "EMERGENCY COMMUNICATIONS" FOR EMERGENCY COMMUNICATION SYSTEMS, OR
    C. "FIRE ALARM/ECS" FOR COMBINATION FIRE ALARM AND COMMUNICATIONS SYSTEMS.
27. WHERE A DETECTOR IS INSTALLED ABOVE THE CEILING, THE DETECTOR SHALL BE EASILY ACCESSIBLE AND THE LOCATION OF THE DETECTOR SHALL BE CLEARLY MARKED. FOR DUCT SMOKE DETECTORS A REMOTE TEST STATION SHALL BE PROVIDED. ELECTRICAL CONTRACTOR SHALL FURNISH ACCESS PANELS TO AREAS THAT REQUIRE SERVICING, TROUBLE SHOOTING, ETC.
28. THE "END OF LINE RESISTANCE" OF EACH CIRCUIT SHALL BE TESTED IN THE PRESENCE OF THE I.O.R. AND SHALL NOT EXCEED THE LISTED MANUFACTURER'S MINIMUM OPERATING VOLTAGE.
29. UNDERGROUND AND EXTERIOR CONDUITS TO HAVE WATERTIGHT FITTINGS AND WIRE LISTED FOR WET LOCATIONS, IN ACCORDANCE WITH CEC, SECTIONS 110.11, 300.5(B), 300.6, 300.9, 310.10, AND 760.3(D).
30. FIRE ALARM SYSTEM IS A FULLY AUTOMATIC SYSTEM. CONTRACTOR TO UTILIZE AREA COVERAGE SMOKE DETECTORS AND ADDRESSABLE CONTROL RELAYS FOR THE SHUTDOWN AND/OR CLOSURE OF HVAC UNITS AND COMBINATION SMOKE/FIRE DAMPERS. CONTROL RELAYS TO BE LOCATED WITHIN 3FT OF THE CONTROLLED CIRCUIT OR APPLIANCE PER NFPA 72, SECTION 21.2.4.
31. PROVIDE (VIA CHANGE ORDER PROCESS) APPROPRIATE MANUFACTURER PRODUCT DATA SHEETS AND APPLICABLE CSFM LISTINGS FOR ALL SUBSTITUTED MANUFACTURER'S MATERIAL, EQUIPMENT OR APPLIANCES, TO DSA PRIOR TO START OF INSTALLATION.
32. CONTRACTOR SHALL PROVIDE FIRE WATCH FOR ALL OCCUPIED AREAS OF WORK WHERE THE REQUIRED FIRE ALARM SYSTEM IS OUT OF SERVICE FOR THE DURATION OF THE SYSTEM OUTAGE. FIRE WATCH AND SYSTEM/EQUIPMENT SHALL BE PER CFC, SECTION 901.7.
33. EMERGENCY VOICE/ALARM COMMUNICATION SYSTEMS SHALL BE DESIGNED AND INSTALLED IN ACCORDANCE WITH NFPA 72. THE OPERATION OF ANY AUTOMATIC FIRE DETECTOR, SPRINKLER WATERFLOW DEVICE OR MANUAL FIRE ALARM BOX SHALL AUTOMATICALLY SOUND AN ALERT TONE FOLLOWED BY VOICE INSTRUCTIONS GIVING APPROVED INFORMATION AND DIRECTIONS FOR A GENERAL OR STAGED EVACUATION IN ACCORDANCE WITH THE FIRE SAFETY EVACUATION PLANS REQUIRED BY CFC, SECTION 404 PER CBC/CFC, SECTION 907.5.2.2
34. EMERGENCY VOICE/ALARM COMMUNICATION SYSTEMS SHALL HAVE THE CAPABILITY TO BROADCAST LIVE VOICE MESSAGES BY PAGING ZONES ON A SELECTIVE AND ALL-CALL BASIS PER CBC/CFC, SECTION 907.5.2.2.2.
35. EMERGENCY VOICE/ALARM COMMUNICATION SYSTEMS SHALL BE PROVIDED WITH AN APPROVED EMERGENCY POWER SOURCE PER CBC/CFC, SECTION 907.5.2.2.5.
36. UPON DETECTION OF CARBON MONOXIDE THE FIRE ALARM SYSTEM SHALL PRODUCE A FOUR- PULSE TEMPORAL PATTERN SIGNAL WITHIN THE BUILDING AND COMPLY WITH NFPA 72 18.4.3.
37. ALL MEMBRANE AND THROUGH-PENETRATIONS OF RATED ASSEMBLIES SHALL BE PROTECTED BY AN APPROVED FIRE STOP SYSTEM AS IDENTIFIED IN CBC, CHAPTER 7, UL OR OTHER LAB TESTING CRITERIA. APPROVED TYPES OF MATERIALS SHALL BE IDENTIFIED WITHIN THE FIRE ALARM SECTION OF THE PROJECT SPECIFICATIONS.
38. CONTROL PANELS AND REMOTE ANNUNCIATORS SHALL BE INSTALLED WITH THEIR BOTTOMS MOUNTED AT 48" ABOVE THE FINISHED FLOOR.
39. THE EXISTING CAMPUS FIRE ALARM SYSTEM SHALL BE MAINTAINED AND OPERATIONAL AT ALL TIMES DURING ALTERATIONS AND CONSTRUCTION. WHEN PORTIONS OF THE SYSTEM REQUIRE ALTERATIONS, THE REMAINDER OF THE SYSTEM SHALL BE KEPT IN SERVICE. IF NECESSARY TO SHUT DOWN ENTIRE FIRE ALARM SYSTEM, CONTRACTOR SHALL PROVIDE FIREWATCH FOR ALL OCCUPIED AREAS OF WORK UNTIL THE FIRE ALARM SYSTEM IS RETURNED TO OPERATIONAL SERVICE. FIREWATCH AND SYSTEM/EQUIPMENT IDENTIFICATION SHALL BE PER THE 2016 CFC, CHAPTER 33. LOCAL FIRE AUTHORITY AND OWNER SHALL BE NOTIFIED 48 HOURS IN ADVANCE OF ANY SHUT DOWN.

FIRE ALARM SYSTEM TESTING NOTES

1. INSTALLATION OF THE SYSTEMS SHALL NOT BE STARTED UNTIL DETAILED DESIGN DOCUMENTS AND SPECIFICATIONS, INCLUDING STATE FIRE MARSHAL LISTING NUMBERS FOR EACH COMPONENT OF THE SYSTEM HAS BEEN APPROVED BY DSA.
2. A STAMPED SET OF APPROVED FIRE ALARM DESIGN DOCUMENTS SHALL BE ON THE JOB SITE AND USED FOR INSTALLATION.
3. DISTRICT SHALL PROVIDE A CERTIFIED IMPARTIAL FIRE ALARM INSPECTOR. DSA, ARCHITECT/ ENGINEER AND OWNER SHALL BE NOTIFIED A MINIMUM OF 48 HOURS PRIOR TO THE FINAL INSPECTION AND/OR TESTING.
4. 100% OF THE SYSTEM IN CONTRACT WILL BE TESTED AND INSPECTED WITH THE CONTRACTOR OR CONTRACTOR'S SUB AND DISTRICT'S ETS STAFF MEMBER PRESENT. INSPECTION WILL INCLUDE, BUT NOT BE LIMITED TO, REMOVING STROBES/HORNS TO CHECK FOR "T-TAPS", REMOVING J-BOX COVERS TO CHECK WIRE GAGE AND SPLICES.
5. FOLLOW ALL REQUIREMENTS AND INSTRUCTIONS PROVIDED BY MANUFACTURER UPON INSTALLATION OF MANUFACTURER'S PRODUCTS AND DEVICES.
6. PRIOR TO REQUESTING FINAL APPROVAL OF THE INSTALLATION, THE INSTALLING CONTRACTOR SHALL FURNISH A WRITTEN STATEMENT TO THE FIRE CODE OFFICIAL THAT THE SUBJECT FIRE PROTECTION SYSTEM HAS BEEN INSTALLED IN ACCORDANCE WITH APPROVED PLANS AND HAS BEEN TESTED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND THE APPROPRIATE INSTALLATION STANDARD. ANY DISCREPANCIES BETWEEN THE DRAWINGS AND THE CODE OR RECOGNIZED STANDARDS SHALL BE BROUGHT TO THE ATTENTION OF DSA AND THE ARCHITECT/ENGINEER OF THE PROJECT. ANY DEVIATIONS FROM THE DESIGN STANDARDS SHALL BE NOTED AND COPIES OF THE APPROVALS FOR SUCH DEVIATIONS SHALL BE ATTACHED TO THE WRITTEN STATEMENT. (CFC, SECTION 901.2.1)
7. UPON COMPLETION OF SYSTEM INSTALLATION, THE SYSTEM SHALL BE TESTED IN THE PRESENCE OF AND IN A MANNER ACCEPTABLE TO DSA/I.O.R. CONTRACTOR SHALL SUPPLY NECESSARY TESTING EQUIPMENT, INCLUDING A "SOUND LEVEL METER" TO CHECK ACCEPTABLE NOISE LEVELS OF AUDIBLE DEVICES. PROVIDE TEST RESULTS PER NFPA 72 TO ARCHITECT, D.S.A., I.O.R. AND TO LOCAL FIRE AUTHORITY, PER CFC, SECTION 907.8.2.
8. INSPECTION, TESTING AND MAINTENANCE SHALL BE IN COMPLIANCE WITH NFPA 72, CHAPTER 14, REACCEPTANCE TESTING SHALL BE IN COMPLIANCE WITH NFPA 72, SECTION 14.4.2.
9. LOCAL FIRE AUTHORITY NOTIFICATION TO BE DOCUMENTED AND RECORDED AS "UNAVAILABLE" OR "CONFIRM WHEN PRESENT".
10. PRIOR TO COMPLETION OF FIRE ALARM SYSTEM THE TWO WAY COMMUNICATION SYSTEM SHALL BE TESTED AND CERTIFIED VIA NFPA 72 EMERGENCY COMMUNICATION SYSTEM SUPPLEMENTARY RECORD OF INSPECTION AND TESTING FORM.
11. THE INSTALLING CONTRACTOR SHALL PROVIDE A COMPLETED RECORD OF COMPLETION PER NFPA 72, FIGURE 7.8.2(A) THROUGH (I) AS APPLICABLE. A COMPLETE RECORD OF THE TESTS AND OPERATIONS OF EACH SYSTEM SHALL BE KEPT UNTIL THE NEXT TEST AND FOR ONE YEAR AFTER PER NFPA 72, SECTION 7.7.1.
12. FIRE ALARM SYSTEM DOCUMENTS SHALL BE HOUSED IN THE DOCUMENT CABINET. THE DOCUMENT CABINET SHALL BE INSTALLED AT THE SYSTEM CONTROL UNIT OR AT ANOTHER APPROVED LOCATION AT THE PROTECTED PREMISES AS REQUIRED BY NFPA 72, SECTION 7.7.2.
13. THE INSTALLING CONTRACTOR SHALL PROVIDE SYSTEM PROGRAMMING FOR SUPERVISORY MONITORING PER CFC, SECTION 907.6.6. SUPERVISORY MONITORING SHALL BE TESTED AND VERIFIED AS SENDING CORRECT SIGNALS IN CONJUNCTION WITH FINAL ACCEPTANCE TEST. OWNER SHALL BE RESPONSIBLE FOR ESTABLISHING AND MAINTAINING A FIRE ALARM SYSTEM MONITORING CONTRACT.
14. THE VOICE/ALARM COMMUNICATION SYSTEM VOICE MESSAGE SHALL COMPLY WITH NFPA 72 SECTIONS 18.4 AND 24.4 FOR GENERAL REQUIREMENTS, INTELLIGIBILITY, AUDIBILITY, MESSAGE PRIORITY, TONES, ETC. REFER TO NFPA 72 ANNEX D, D.1 THROUGH D.6 FOR DETERMINING THE FUNDAMENTALS OF TEST PROTOCOL AND METHOD OF MEASURING INTELLIGIBILITY.

SEQUENCE OF OPERATIONS

ACTION \ DEVICE	120 VOLT POWER FAILURE	SYSTEM TROUBLE, WIRING FAULT OR OPEN, GROUND FAULT, SYSTEM LOW BATTERY, CIRCUIT SHORT	MANUAL PULL STATION	AREA SMOKE DETECTOR	CARBON MONOXIDE DETECTOR	AREA or ATTIC HEAT DETECTOR	SMOKE/FIRE DAMPER SMOKE DETECTOR	SPRINKLER WATER FLOW SWITCH	SPRINKLER VALVE TAMPER SWITCH (SUPERVISORY)
SOUND CONTROL PANEL TROUBLE BUZZER	YES	YES	NO	NO	YES	NO	NO	NO	NO
SOUND CONTROL PANEL SUPERVISORY BUZZER	NO	NO	NO	NO	YES	NO	NO	NO	YES
SOUND CONTROL PANEL ALARM BUZZER	NO	NO	YES	YES	YES	YES	YES	YES	NO
ACTIVATE RELAY FOR CENTRAL STATION MONITORING	YES	YES	YES	YES	YES	YES	YES	YES	YES
ANNUNCIATE AT FIRE ALARM CONTROL PANEL (ALARM)	NO	NO	YES	YES	YES	YES	YES	YES	NO
ANNUNCIATE AT FIRE ALARM CONTROL PANEL (TROUBLE)	YES	YES	NO	NO	NO	NO	NO	NO	NO
ANNUNCIATE AT REMOTE ANNUNCIATOR PANEL (ALARM)	NO	NO	YES	YES	YES	YES	YES	YES	NO
ANNUNCIATE AT REMOTE ANNUNCIATOR PANEL (TROUBLE)	YES	YES	NO	NO	NO	NO	NO	NO	NO
ACTIVATE AUDIBLE NOTIFICATION ALARM SIGNAL THROUGHOUT CAMPUS	NO	NO	YES	YES	NO	YES	YES	YES	NO
ACTIVATE VISUAL NOTIFICATION ALARM SIGNAL THROUGHOUT CAMPUS	NO	NO	YES	YES	NO	YES	YES	YES	NO
ACTIVATE AUDIBLE NOTIFICATION ALARM SIGNAL THROUGHOUT BLDG	NO	NO	YES	YES	YES	YES	YES	YES	NO
ACTIVATE VISUAL NOTIFICATION ALARM SIGNAL THROUGHOUT BLDG	NO	NO	YES	YES	YES	YES	YES	YES	NO
SOUND SPRINKLER BELL ALARM	NO	NO	NO	NO	NO	NO	NO	YES	NO
SHUT DOWN ASSOCIATED AIR HANDLING (HVAC) THROUGHOUT BUILDING	NO	NO	NO	YES	NO	NO	YES	YES	NO
CLOSE COMBO SMOKE/ FIRE DAMPERS THROUGH FLOOR OF ALARM (1)	YES	NO	NO	YES	NO	NO	YES	YES	NO
NOTIFY FIRE DEPARTMENT VIA MONITORING STATION	NO	NO	YES	YES	YES	YES	YES	YES	NO
SOUND AN ALERT TONE FOLLOWED BY VOICE INSTRUCTION	NO	NO	YES	YES	YES	YES	YES	YES	NO

(1) PER CMC, SECTION 605.8, When the automatic activation of a combination smoke-fire damper occurs, the HVAC system serving such dampers shall immediately shut down. The HVAC system shall not be restarted until all the dampers are reset and fully opened. ALL HVAC UNITS CONTAINING COMBINATION SMOKE FIRE DAMPERS AS PART OF THEIR DUCTING SYSTEM SHALL BE PROVIDED WITH SHUNT RELAYS AND DEVICES FOR IMMEDIATE SHUT DOWN UPON THE ACTIVATION / CLOSURE OF ASSOCIATED COMBINATION SMOKE FIRE DAMPERS.

FIRE ALARM SYMBOL LEGEND

SYMBOL	DESCRIPTION	MODEL	MANUFACTURER	BACKBOX	MOUNTING HEIGHT	C.S.F.M. NUMBER
VECP	(E) FIRE ALARM/VOICE EVACUATION CONTROL PANEL (A#02-117196)	E3 CLASSIC	GAMEWELL-FCI	EXISTING	EXISTING	7165-1703:0125
AMP	VOICE EVACUATION AUDIO AMPLIFIER	INX	GAMEWELL-FCI	PROVIDED	5'-6" A.F.F. TO TOP	6911-1703:0118
FAPS	FIRE ALARM VISUAL POWER SUPPLY	HPF24S6	GAMEWELL-FCI	PROVIDED	5'-6" A.F.F. TO TOP	7315-1637:0102
FATC	FIRE ALARM TERMINAL CABINET	N/A	BY ELECTRICIAN	18"SQ. x 6"D U.N.O. (RED)	VERIFY IN FIELD	N/A
SD	AREA SMOKE DETECTOR (ADDRESSABLE/PHOTO.)	ASD-PL3 B300-6 (BASE)	GAMEWELL-FCI	4S DEEP BOX W/ 3-0 RING	CEILING	7272-1703:0501 7300-1653:0109
CO	MULTI-CRITERIA DETECTOR (ADDR. SMOKE/CO/IR/HEAT) WITH SOUNDER BASE	2251-COPTIR B200S (BASE)	SYSTEM SENSOR	4S DEEP BOX W/ 3-0 RING	CEILING	3242-1653:0207 7300-1653:0213
HD	AREA HEAT DETECTOR (ADDRESS./FIXED 190°F)	ATD-L3H B501 (BASE)	GAMEWELL-FCI	4S DEEP BOX W/ 3-0 RING	ABOVE ACCESSIBLE CEILING, U.O.N.	7270-1703:0502 7300-1653:0109
CR	FIRE ALARM RELAY CONTROL MODULE	AOM-2RF	GAMEWELL-FCI	4S DEEP BOX	VERIFY IN FIELD	7300-1703:0102
M	FIRE ALARM MONITOR MODULE	AMM-2F	GAMEWELL-FCI	4S DEEP BOX	VERIFY IN FIELD	7300-1703:0102
S WP	FIRE ALARM SPEAKER (WEATHERPROOF/WALL)	SPRK (RED)	SYSTEM SENSOR	WP BACKBOX PROVIDED	90" A.F.F. TO TOP	7320-1653:0201
SF cd	FIRE ALARM SPEAKER/STROBE (WALL)	SPSWL (WHITE)	SYSTEM SENSOR	4S DEEP BOX W/ 4S EXTENSION	80" A.F.F. TO BOTTOM	7320-1653:0505
SF cd	FIRE ALARM SPEAKER/STROBE (CEILING)	SPSCWL (WHITE)	SYSTEM SENSOR	4S DEEP BOX W/ 4S EXTENSION	CEILING	7320-1653:0505
F cd	FIRE ALARM STROBE (WALL)	SWL (WHITE)	SYSTEM SENSOR	4S DEEP BOX W/ 4S EXTENSION	80" A.F.F. TO BOTTOM	7125-1653:0504
F cd	FIRE ALARM STROBE (CEILING)	SCWL (WHITE)	SYSTEM SENSOR	4S DEEP BOX W/ 4S EXTENSION	CEILING	7125-1653:0504
SYNC	AUDIBLE/VISUAL SYNC MODULE	MDL3	SYSTEM SENSOR	5S DEEP BOX W/ 5S EXTENSION	VERIFY IN FIELD	7300-1653:0202
TS	SPRINKLER RISER TAMPER SWITCH	OSY2 SERIES	SAFE SIGNAL	VERIFY IN FIELD	VERIFY IN FIELD	7770-0328:0524
WF	SPRINKLER RISER WATERFLOW DETECTOR	WFDN SERIES	SAFE SIGNAL	VERIFY IN FIELD	VERIFY IN FIELD	7770-0328:0527
B WP	SPRINKLER RISER BELL (WEATHERPROOF) (120VAC)	SSV120-10	SYSTEM SENSOR	WBB WP BACKBOX	90" A.F.F. TO TOP	7135-1653:0100
J	FIRE ALARM JUNCTION BOX	N/A	BY ELECTRICIAN	4S BOX, U.N.O.	VERIFY IN FIELD	N/A

A.F.F.	ABOVE FINISHED FLOOR	N/A	NOT APPLICABLE
E.O.L.	END OF LINE RESISTOR	U.N.O.	UNLESS NOTED OTHERWISE
(E)	EXISTING DEVICE	VL	VERIFY LOCATION IN FIELD
F.B.O.	FURNISHED BY OTHERS	WP	WEATHERPROOF DEVICE
TSP	TWISTED SHIELDED PAIR	cd	INDICATED CANDELA RATING OF STROBE DEVICE

GENERAL FIRE ALARM SYMBOL LIST NOTES:

1. CONFIRM NOTIFICATION DEVICE COLOR (WHITE OR RED) WITH ARCHITECT PRIOR TO ANY ORDER OR INSTALLATION. COLOR TO BE INDICATED IN SHOP DRAWING SUBMITTAL.
2. NUMBER ADJACENT TO VISUAL DEVICES INDICATES MINIMUM CANDELA RATING OF STROBE DEVICE.

PLAN REVIEW REQUIREMENTS AND APPLICABLE CODES AND STANDARDS

1.0 FIRE ALARM PLAN REVIEW

A. FIRE ALARM PLAN REVIEW
1. AS PART OF THE FIRE ALARM PLAN REVIEW, PLANS AND SPECIFICATIONS FOR THE FIRE ALARM SYSTEM HAVE BEEN INCLUDED FOR REVIEW AND COMMENT BY THE DIVISION OF THE STATE ARCHITECT, FIRE & LIFE SAFETY.
2. THE FLOOR PLANS AND SPECIFICATIONS INCLUDE THE FOLLOWING: LOCATIONS OF ALL ALARM-INITIATING AND SIGNALING DEVICES, CONTROL AND TROUBLE SIGNALING EQUIPMENT (FIRE ALARM CONTROL PANEL, BUILDING ANNUNCIATION (FIRE ALARM ANNUNCIATOR).

B. FIRE ALARM COMPONENTS
1. PROVIDE CALIFORNIA STATE FIRE MARSHAL LISTING SHEETS AND U.L. LISTING NUMBERS FOR EACH COMPONENT.
2. EQUIPMENT POWER CONNECTIONS.
3. RISER DIAGRAM SHOWING EACH COMPONENT.
4. VOLTAGE DROP CALCULATIONS.
5. POWER CONNECTIONS TO APPLICABLE COMPONENTS.
6. WIRE AND/OR CABLING TYPES AND SIZES.
7. PROVIDE CATALOG DATA SHEETS FOR ALL FIRE ALARM SYSTEM COMPONENTS.
8. CONTRACTOR TO FURNISH STATEMENT OF COMPLIANCE BEFORE REQUESTING FINAL APPROVAL OF INSTALLATION IN ACCORDANCE WITH CFC, SECTION 901.2.1.
9. A SATISFACTORY TEST OF THE ENTIRE SYSTEM SHALL BE MADE IN THE PRESENCE OF THE PROJECT INSPECTOR AND, IF APPLICABLE, LOCAL FIRE AUTHORITY.
10. THE INSTALLER SHALL SUPPLY THE OWNER WITH A WRITTEN OPERATING, TESTING AND MAINTENANCE INSTRUCTIONS, POINT-TO-POINT AS BUILT DRAWINGS AND EQUIPMENT SPECIFICATIONS. AS BUILT RECORDS SHALL BE MAINTAINED ON PREMISES FOR A MINIMUM OF THREE YEARS PER CFC, SECTION 901.6.3.

C. SCOPE OF WORK
1. INSTALL A FULLY AUTOMATIC, ADDRESSABLE, FIRE ALARM SYSTEM WITH AN EMERGENCY VOICE/ALARM COMMUNICATION SYSTEM WITHIN ALL BUILDINGS IN SCOPE OF PROJECT AS DEFINED PER CFC, SECTION 907.2.3 AND NFPA 72.
2. FIRE ALARM SYSTEM SHALL TRANSMIT THE ALARM, SUPERVISORY AND TROUBLE SIGNALS TO AN APPROVED SUPERVISING STATION IN ACCORDANCE WITH NFPA 72. THE SUPERVISING STATION SHALL BE U.L. LISTED AS UUFX (CENTRAL STATION) PER CFC, SECTION 907.6.6.3.

2.0 LIST OF CURRENT CALIFORNIA CODE OF REGULATIONS

APPLICABLE CODES AS OF MARCH 5, 2022

2022 California Administrative Code (CAC), Part 1, Title 24, C.C.R.

2019 California Building Code (CBC), Volumes 1 & 2, Part 2, Title 24, C.C.R. (2018 International Building Code of the International Code Council, with California Amendments.)

2019 California Electrical Code (CEC), Part 3, Title 24, C.C.R. (2017 National Electric Code of the National FIre Protection Assoc., NFPA)

2019 California Mechanical Code (CMC), Part 4, Title 24, C.C.R. (2018 Uniform Mechanical Code of the International Association of Plumbing and Mechanical Officials, IAPMO.)

2019 California Plumbing Code (CPC), Part 5, Title 24, C.C.R. (2018 Uniform Plumbing Code of the International Association of Plumbing and Mechanical Officials, IAPMO.)

2019 California Energy Code, Part 6, Title 24, C.C.R.

2019 California Historical Building Code, Title 24, C.C.R.

2019 California Fire Code (CFC), Part 9, Title 24, C.C.R. (2018 International Fire Code with California Amendments)

2019 California Existing Building Code (CEBC), Part 10, Title 24, C.C.R. (2018 International Existing Building Code of the International Code Council, with amendments)

2019 California Green Building Standards Code (CALGreen), Part 11, Title 24, C.C.R.

2019 California Referenced Standards Code, Part 12, Title 24, C.C.R.

LIST OF FEDERAL CODES AND STANDARDS (if applicable)

Americans with Disabilities Act (ADA), Title II or Title III

For Title II: Uniform Federal Accessibility Standards (UFAS) or ADA Standards for Accessible Design (Appendix A of 28 CFR Part 36.)

For Title III: ADA Standards for Accessible Design (Appendix A of 28 CFR Part 36.)

Americans with Disabilties Act Accessibility Guidelines (ADAAG) (with amendments through September 2002)

PARTIAL LIST OF APPLICABLE NFPA STANDARDS:

NFPA 13-Automatic Sprinkler Systems (CA Amended)	2016 Edition
NFPA 14-Standpipes Systems (CA Amended)	2013 Edition
NFPA 17-Standard for Dry Chemical Extinguishing Systems	2017 Edition
NFPA 17a-Standard for Wet Chemical Systems	2017 Edition
NFPA 20-Installation Stationary Pumps for Fire Protection	2016 Edition
NFPA 22-Water tanks for Private Fire Protection	2013 Edition
NFPA 24-Installation of Private Fire Service Mains (CA Amended)	2016 Edition
NFPA 72-National Fire Alarm and Signaling Code (CA Amended)	2016 Edition
NFPA 80-Fire Door and Other Opening Protectives	2016 Edition
NFPA 92-Standard for Smoke Control Systems	2015 Edition
NFPA 253-Critical Radiant Flux of Floor Covering Systems	2015 Edition
NFPA 720-Carbon Monoxide (CO) Detection and Warning	2015 Edition
NFPA 2001-Clean Agent Fire Extinguishing Systems (CA Amended)	2015 Edition
ICC 300-ICC Standards on Bleachers, Folding and Telescoping Seating and Grandstands	2017 Edition
UL 38-Manual Operating Signal Boxes (with revisions through February 2, 2005 as amended)	1999 Edition
UL 268-Smoke Detectors for Fire Alarm Systems	2009 Edition
UL 268A-Smoke Detectors Duct Applications (with revisions through October 22, 2003 as amended)	2009 Edition
UL 300-Fire Testing of Fire Extinguishing Systems for Protection Of Restaurant Cooking Areas (with revisions through December 2014 as amended)	2005 Edition
UL 464-Audible Signal Appliances (with revisions through October 10, 2003 as amended)	2003 Edition
UL 521-Heat Detectors for Fire Protective Signaling Systems (with revisions through July 20, 2005 as amended)	1999 Edition
UL 864-Control Units for Fire Protective Signaling Systems (with revisions through December 2014)	2003 Edition

Reference code section for NFPA Standards-2019 CBC (SFM) Chapter 35

See Chapter 35 for State of California amendments to NFPA Standards.

FIRE ALARM WIRE LEGEND

WIRE DESIGNATION	WIRE IN CONDUIT	WIRE IN CONDUIT UNDERGROUND/WET LOC.	UNDERGROUND/WET WIRE DESIGNATION
INITIATING CIRCUIT Z	2 CONDUCTOR #18 FPL TWISTED/ UNSHIELDED WITH OVERALL JACKET	2 CONDUCTOR #18 FPL TWISTED/ UNSHIELDED WITH OVERALL JACKET	INITIATING CIRCUIT ZU
POWER CKT. (24VDC) P	2 CONDUCTOR #14 THHN STRANDED	2 CONDUCTOR #12 STRANDED TYPE THWN	POWER CKT. (24VDC) PU
NETWORK CONTROL C	2 CONDUCTOR #12 THHN STRANDED	2 CONDUCTOR #12 STRANDED TYPE THWN	NETWORK CONTROL CU
ANNUNCIATOR D	4 CONDUCTOR #18 FPL TWISTED/ UNSHIELDED WITH OVERALL JACKET	4 CONDUCTOR #18 FPL TWISTED/ UNSHIELDED WITH OVERALL JACKET	ANNUNCIATOR DU
AUDIBLE LOOP B	2 CONDUCTOR #18 FPL TWISTED/ SHIELDED WITH OVERALL JACKET	2 CONDUCTOR #18 FPL TWISTED/ SHIELDED WITH OVERALL JACKET	AUDIBLE LOOP BU
S-BUS S	2-PAIR 4 CONDUCTOR #16 FPLR	2-PAIR 4 CONDUCTOR #16 FPLR	S-BUS SU
AUDIBLE (SPEAKER) A	2 CONDUCTOR #16 FPL TWISTED/ SHIELDED WITH OVERALL JACKET	2 CONDUCTOR #16 FPL TWISTED/ SHIELDED WITH OVERALL JACKET	AUDIBLE (SPEAKER) AU
VISUAL (STROBE) V	2 CONDUCTOR #12 FPL TWISTED/ UNSHIELDED WITH OVERALL JACKET	2 CONDUCTOR #12 FPL TWISTED/ UNSHIELDED WITH OVERALL JACKET	VISUAL (STROBE) VU

NOTE:
1. ALL WIRE TO BE CLASS 'B' PATHWAY SURVIVABILITY LEVEL 1.
2. ALL WIRE MODEL NUMBERS ARE WEST PENN. APPROVED EQUAL BY OTHER MANUFACTURER IS ACCEPTABLE.
3. COLOR CODE ALL FIRE ALARM CONDUCTORS PER DISTRICT STANDARDS. VERIFY COLOR SCHEMES PRIOR TO ORDERING FIRE ALARM CONDUCTORS.

COMPLETE FIRE ALARM SUBMITTAL

AUTOMATIC ADDRESSABLE FIRE ALARM SYSTEM WITH EMERGENCY VOICE/ALARM COMMUNICATION SYSTEM

OWNER: Lodi Unified School District

PROJECT NAME: Bear Creek High School Agriculatural Science Bulding Inc. 2

CLIENT ADDRESS: 10555 THORTON RD., STOCKTON, CA 95209

REGISTERED PROFESSIONAL ENGINEER RAYMOND W. SWARTZ No. E15610 EX. 12/31/2023 ELECTRICAL STATE OF CALIFORNIA

REVISIONS:

	DESCRIPTION	DATE
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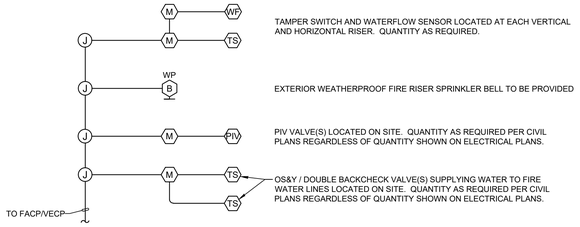
PROJECT NO:	2022-40112
DATE ISSUED:	02.09.2023
SCALE:	None

EFA0.1

FIRE ALARM SYSTEM INFORMATION

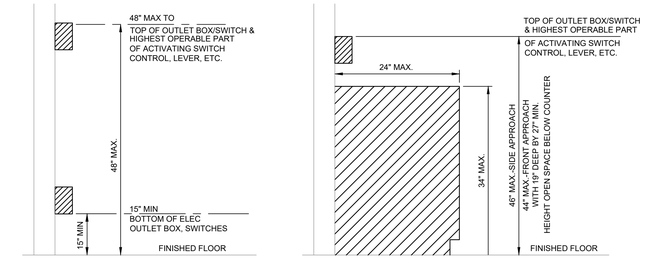
tk1sc COLLABORATIVE
11870 Pierce Street, Suite 160
Riverside, California 92505
951.299.4160 www.tk1sc.com
Project Leader - Bill Voller
Electrical Lead - Nick Bruno
tk1sc Job #: B2202912.000



SPRINKLER SYSTEM CONNECTION SCHEMATIC

SCALE: N.T.S.

4

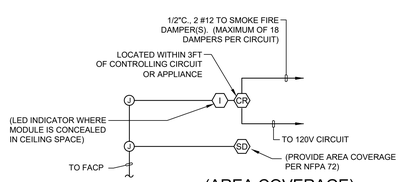


ALL DEVICE HEIGHTS DEPICTED SHALL BE MODIFIED AS REQUIRED BY GOVERNING BUILDING CODES. CONTRACTOR TO VERIFY/RECONCILE APPLICABLE CODE REQUIREMENTS AND ANY DEVICE HEIGHT REQUIREMENTS DEPICTED ON ARCHITECTURAL OR INTERIOR DESIGN PLANS & SPECIFICATIONS PRIOR TO DEVICE ROUGH-IN. CONFLICTS OR LACK OF MOUNTING HEIGHT SPECIFICITY ON THE ARCHITECTURAL OR INTERIOR DESIGN PLANS & SPECIFICATIONS SHALL BE CAUSE FOR THE CONTRACTOR TO ISSUE A FORMAL WRITTEN RFI FOR RESOLUTION. DEVICE MOUNTING HEIGHT CLARIFICATIONS/SPECIFICATIONS SHALL NOT RESULT IN AN ADDITIONAL COST TO THE OWNER - CONTRACTOR SHALL INCLUDE ALL COSTS IN BASE BID.

MOUNTING HEIGHT OVER OBSTRUCTION DETAIL

SCALE: NTS

1



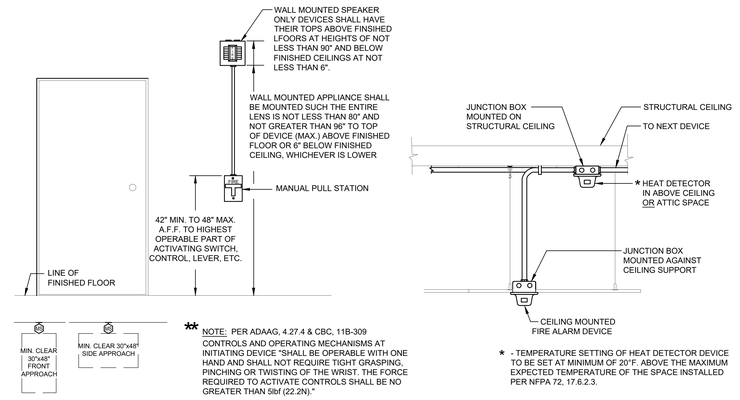
(AREA COVERAGE)

Note:
PER CMC 605.8, When the automatic activation of a smoke damper or a combination smoke-fire damper occurs, the HVAC system serving such dampers shall immediately shut down. ALL HVAC UNITS CONTAINING COMBINATION SMOKE FIRE DAMPERS AS PART OF THEIR DUCTING SYSTEM SHALL BE PROVIDED WITH SHUNT RELAYS AND DEVICES FOR IMMEDIATE SHUT DOWN UPON THE ACTIVATION / CLOSURE OF ASSOCIATED COMBINATION SMOKE FIRE DAMPERS.

SMOKE/FIRE DAMPER SCHEMATIC

SCALE: N.T.S.

5



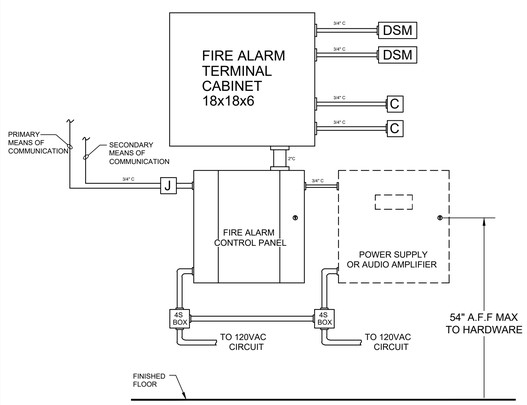
** NOTE: PER ADAAG, 4.27.4 & CBC, 11B-309 CONTROLS AND OPERATING MECHANISMS AT INITIATING DEVICE "SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING OR TWISTING OF THE WRIST. THE FORCE REQUIRED TO ACTIVATE CONTROLS SHALL BE NO GREATER THAN 5lbf (22.2N)."

★ - TEMPERATURE SETTING OF HEAT DETECTOR DEVICE TO BE SET AT MINIMUM OF 20°F. ABOVE THE MAXIMUM EXPECTED TEMPERATURE OF THE SPACE INSTALLED PER NFPA 72, 17.6.2.3.

DEVICE MOUNTING DETAILS

SCALE: N.T.S.

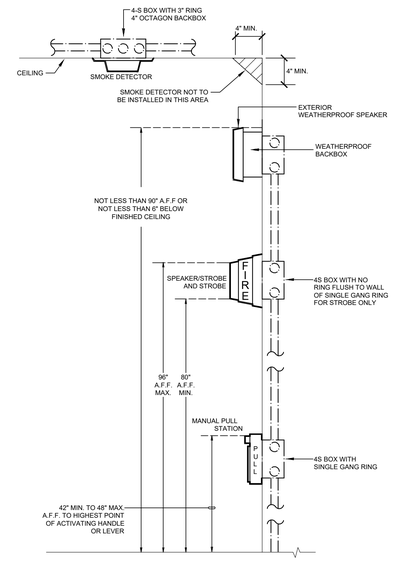
2



FIRE ALARM PANEL/POWER SUPPLY MOUNTING ELEVATION

SCALE: N.T.S.

7



GENERAL NOTES:

1. THE ENTIRE LENS OF STROBE LIGHTS MUST BE BETWEEN 80" AND 96" ABOVE FLOOR FINISH. (NFPA 72, 18.5.5)
2. MANUAL FIRE ALARM BOXES SHALL BE INSTALLED IN ACCORDANCE WITH CFC, SECTIONS 907.4 THROUGH 907.5.
3. WHEN APPLICABLE, MANUAL FIRE ALARM BOXES SHALL BE LOCATED NOT MORE THAN 5 FEET FROM THE ENTRANCE TO EACH EXIT. ADDITIONAL MANUAL FIRE ALARM BOXES SHALL BE LOCATED SO THAT TRAVEL DISTANCE TO THE NEAREST BOX DOES NOT EXCEED 200 FEET. (CFC, 907.4.2.1)

MOUNTING HEIGHT DETAIL

SCALE: N.T.S.

3

SECTION A-A

PENETRATION THRU GYPSUM BOARD WALL

NO SCALE

System No.W-L-1252
January 22, 2019
F Ratings - 1, 2, 3 and 4 Hr (See Items 1 and 3)
T Ratings - 0 Hr
L Rating At Ambient - less than 1 CFM/sq ft
L Rating At 400 F - less than 1 CFM/sq ft

1. Wall Assembly - The 1, 2, 3 or 4 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400, V400 or W400 Series Wall or Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:

   A. Studs - Wall framing may consist of steel channel studs. Steel studs to be min 3-1/2 in. (89 mm) wide by 1-3/8 in. (35 mm) deep channels spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* - Nom 1/2 or 5/8 in. (13 or 16 mm) thick, 4 ft. (122 cm) wide with square or tapered edges. The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 26 in. (660 mm).

   The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.

2. Through Penetrant - One metallic pipe, conduit or tube to be installed either concentrically or eccentrically within the firestop system. The annular space between the pipe, conduit or tube and periphery of opening shall be min 0 in. (point contact) to max 7/8 in. (22 mm). Pipe, conduit or tube to be rigidly supported on both sides of wall assembly.
   A. Steel Pipe - Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe - Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. Conduit - Nom 4 in. (102 mm) diam (or smaller) rigid steel conduit.
   D. Conduit - Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic conduit.
   E. Copper Tubing - Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
   F. Copper Pipe - Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.

3. Fill, Void or Cavity Material* - Sealant - 1. Fill material applied within annulus , flush with both surfaces of wall. Type and thickness of sealant is dependent on F and FH Ratings as indicated in Table below. An additional 1/2 in. (13 mm) diameter bead of sealant applied at penetrant/gypsum board interface at point contact location on both surfaces of wall.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC – FS-ONE Sealant, FS-ONE MAX Intumescent Sealant or CP 606 Sealant

F, FH RATINGS (HR)	SEALANT TYPE	SEALANT THICKNESS, IN. (MM)
1,2	FS-ONE, FS-ONE MAX OR CP 606	5/8 (16)
3	FS-ONE, FS-ONE MAX OR CP 606	1 (25)
4	FS-ONE, FS-ONE MAX	1 (25)

*Bearing the UL Classification Marking

SECTION A-A

PENETRATION THRU CONCRETE WALL OR FLOOR

NO SCALE

System No. C-AJ-1630
DECEMBER 20, 2013
F Ratings - 2, 3, and 4 Hr (See Item 4)
T Rating - 0 Hr
L Rating At Ambient - less than 1 CFM/sq ft
L Rating At 400 F - less than 1 CFM/sq ft
W Rating - Class I (See Item 4)

1. Floor or Wall Assembly - 1. See Configuration A above. Reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/cu meter) concrete as specified in the Table in item 4 below. Wall may also be constructed of any UL Classified Concrete Blocks'. Max diam of sleeved opening is 32 in. (813 mm).
See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.

1A. Floor Assembly - See Configuration B above. Min 6 in. (152 mm) thick UL Classified hollow-core Precast Concrete Units'. Max diam of opening is 7 in. (178 mm).
See Precast Concrete Units (QTTV) category in the Fire Resistance Directory for names of manufacturers.

2. Steel Sleeve (Optional) - Nom 32 in. (813 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe sleeve cast or grouted into floor or wall assembly, flush with both surfaces of floor or wall. As an option, sleeve may extend max 2 in. above top surface of floor or beyond one or both surfaces of wall. Steel sleeve may be used in 2 and 3 hr F Rated systems only.

3. Through Penetrants - One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall assembly. See Table in Item 4 for sizes of penetrants A, B, D and E that may be used. See Item 3C below for size of conduit that may be used. The annular space shall be as specified in Table in Item 4 below. The following types and sizes of metallic pipes, conduits or tubing may be used:

   A. Steel Pipe — Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe - Cast or ductile iron pipe.
   C. Conduit - Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing or nom 6 in. (152 mm) diam (or smaller) steel conduit.
   D. Copper Tubing - Type L (or heavier) copper tubing.
   E. Copper Pipe - Regular (or heavier) copper pipe.

4. Firestop System - The F Rating of the system is dependent upon the type of concrete, thickness of concrete, annular space, fill and packing material thickness, packing material density and penetrant size as shown in the Table below. W Rating applies to annular spaces of min 0 in. (point contact) to max 1-7/8 in. and to Configuration A detail only.

# RATING HR	MIN THICK CONCRETE IN.	ANNULAR SPACE IN.	MIN THICK PACKING MTL. IN.	MIN DENSITY PACKING MTL PCF KG/CU MTR	MIN THICK FILL MTL. IN.	PENETRANT SIZE IN. DIAM (OR SMALLER). D.E. COPPER	A,B STEEL, IRON
2	5-1/2(140)	0 TO 1-7/8 (0 TO 48)	5 (127)	4 (64)	1/2 (13)	4 (102)	16 (406)
3	4-1/2(114)	0 TO 2-1/8 (0 TO 54)	4 (64)	4 (64)	1/4 (6)	6 (152)	30 (762)
4	5-1/2(140)	0 TO 1-7/8 (0 TO 48)	5 (127)	4 (64)	1/2 (13)	4 (102)	8 (203)

A. Packing Material – Min 4-1/4 or 5 in. (108 or 127 mm) thickness of min 4.0 pcf (64 kg/cu meter) mineral wool batt insulation firmly packed into opening as a permanent form as specified in the Table above. Packing material to be recessed from top surface of floor or top end of sleeve, or from both surfaces of wall or ends of sleeve, as required to accommodate the required thickness of fill material. For hollow-core floor applications as shown in Configuration B, one half of the required thickness of mineral wool packing material shall be installed flush with the bottom surface of the floor and the remaining half of the mineral wool packing material installed at the top of the opening and recessed from the top surface of the floor to accommodate the required thickness of the fill material.

B. Fill, Void or Cavity Material* – Caulk – Min 1/4 or 1/2 in. (6 or 13 mm) thickness of fill material as specified in the Table above applied within the annulus, flush with top surface of floor or top end of sleeve, or with both surfaces of wall or ends of sleeve. At the point contact location betWeen pipe and concrete or sleeve, a min 1/2 in. (13 mm) diam bead of fill material shall be applied. As an option, for hollow-core floors, the packing material (Item 4A) on the bottom surface of the floor may be recessed to accommodate a 1/4 in. (6 mm) depth of fill material installed flush with bottom surface of floor.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC – CFS-S SIL GG (floors or walls) and CFS-S SIL SL (floors only)

*Bearing the UL Classification Mark

SECTION A-A

PENETRATION THRU CONCRETE FLOOR

NO SCALE

SYSTEM NO.C-AJ-1276
April 25, 2012
F RATING-3 HR
T RATING-0 HR

Floor or Wall Assembly - 1. Floor or Wall Assembly – Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete. Wall may also be constructed of any UL Classified Concrete Blocks". Max diam of opening is 6 in. (152 mm).

See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. Through Penetrants - One metallic pipe, conduit or tubing to be centered within the firestop system. A nom annular space of 3/4 in. (19 mm) is required within the firestop system. Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:

   A. Steel Pipe - Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Conduit - Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing or steel conduit.

3. Firestop System - The firestop system shall consist of the following:
A. Packing or Forming Materials – Optional – One of the following packing or forming materials may be used:

A1. Foam Backer Rod – Foam backer rod tightly packed into the opening as a permanent form. Packing material to be recessed from the top surface of floor or both surfaces of wall as required to accommodate the required thickness of putty.

A2. Mineral Wool Batt Insulation – Min 4 pcf (64 kg/m3), tightly packed into the opening as a permanent form. Packing material to be recessed from the top surface of floor or both surfaces of wall as required to accommodate the required thickness of putty.

A3. Forming Material* – Forming material to be foamed into the opening as a permanent form. Forming material to be recessed from the top surface of floor or both surfaces of wall as required to accommodate the required thickness of putty.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC – CP812 or CP-AS CJF Foam Sealant

B. Fill, Void or Cavity Material* – Putty – Min 1 in. (25 mm) thickness of putty applied within the annulus, flush with top surface of floor or with both surfaces of wall.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC – CP 618 Firestop Putty Stick

*Bearing the UL Classification Mark

THROUGH RATED WALL OR FLOOR PENETRATIONS (U.L. LISTINGS)

SCALE: N.T.S.

10

COMPLETE FIRE ALARM SUBMITTAL

AUTOMATIC ADDRESSABLE FIRE ALARM SYSTEM WITH EMERGENCY VOICE/ALARM COMMUNICATION SYSTEM

OWNER: Lodi Unified School District

PROJECT NAME: Bear Creek High School Agriculatural Science Bulding Inc. 2

CLIENT ADDRESS: 10555 THORTON RD., STOCKTON, CA 95209

REGISTERED PROFESSIONAL ENGINEER RAYMOND W. SWOYER No. E15610 12/31/2023 ELECTRICAL STATE OF CALIFORNIA

REVISIONS:

	DESCRIPTION	DATE
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10		

PROJECT NO: 2022-40112

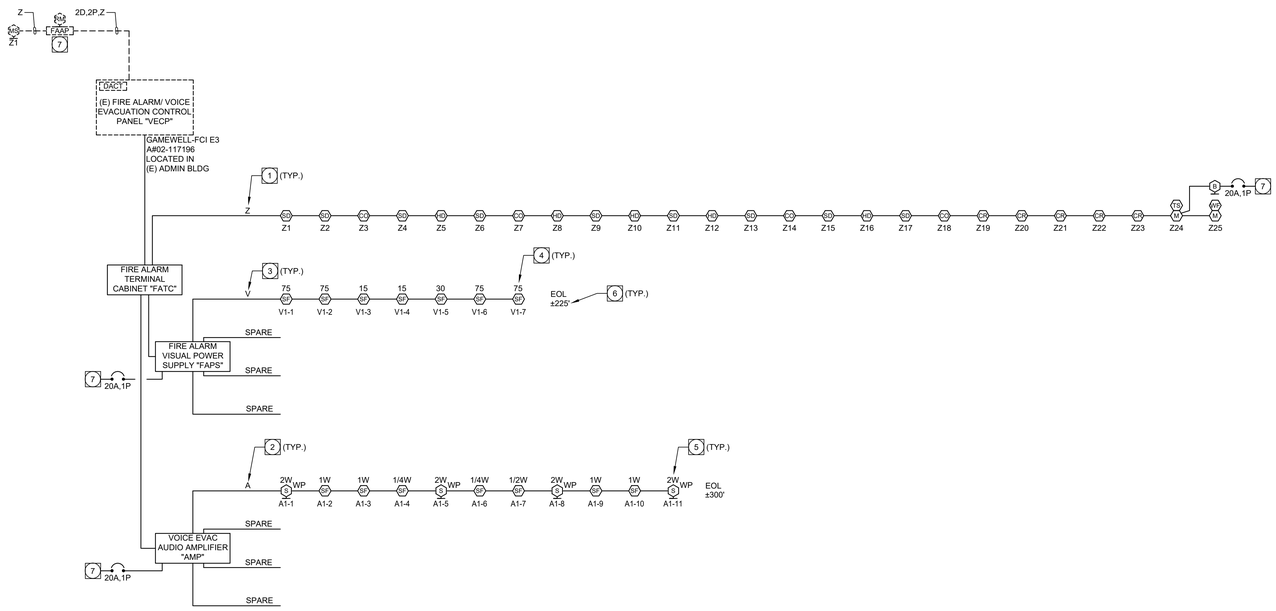
DATE ISSUED: 02.09.2023

SCALE: None

EFA0.2

FIRE ALARM DETAILS

tk1sc COLLABORATIVE
11870 Pierce Street, Suite 160
Riverside, California 92505
951.299.4160 www.tk1sc.com
Project Leader - Bill Voller
Electrical Lead - Nick Bruno
tk1sc Job #: B2202912.000



FIRE ALARM RISER DIAGRAM

SCALE: N.T.S.

1

RISER DIAGRAM PLAN NOTES:

1. Z - ZONABLE/ADDRESSABLE CIRCUIT, PROVIDE 2#16 TWISTED PAIR PER CIRCUIT, TYPICAL.
2. A - AUDIBLE NOTIFICATION CIRCUIT, PROVIDE 2#14 PER CIRCUIT, TYPICAL.
3. V - VISUAL NOTIFICATION CIRCUIT, PROVIDE 2#12 PER CIRCUIT, TYPICAL.
4. CANDELA RATING OF STROBE DEVICE, TYPICAL.
5. DISTANCE TO END OF LINE (EOL) DEVICE, TYPICAL.
6. WORST-CASE VOLTAGE DROP PERCENTAGE, TYPICAL.
7. PROVIDE 3/4"C. WITH 2#12, 1#12 GRD. TO 120V DEDICATED CIRCUIT FOR POWER. PROVIDE 20AMP, 1-POLE CIRCUIT BREAKER WITH APPROVED LOCK-ON DEVICE. RED INDICATOR AND IDENTIFIED AS "FIRE ALARM CONTROL CIRCUIT" (NFPA 72, 10.5.5.2). CONNECT AS REQUIRED. PROVIDE ALL REQUIRED MOUNTING HARDWARE. MATCH A.I.C. RATING OF DEVICES USED.
8. FIRE ALARM ANNUNCIATOR PANEL (FAAP). VERIFY WITH DISTRICT REPRESENTATIVE, A.H.J. AND ARCHITECT FOR EXACT LOCATION.
9. PROVIDE (1) DEDICATED PHONE LINE (LAND LINES) AND (1) DEDICATED APPROVED MEANS OF COMMUNICATION/TRANSMISSION PER NFPA 72 FOR FIRE ALARM SYSTEM MONITORING. CONTRACTOR TO SUPPLY UDACT (UNIVERSAL DIGITAL ALARM COMMUNICATOR TRANSMITTER) WHEN NOT SUPPLIED WITH CONTROL PANEL.
10. PROVIDE 2"C. WITH FIBER OPTIC CABLING PER MANUFACTURERS REQUIREMENTS.

FIRE ALARM GENERAL NOTES:

1. ALL WALL-MOUNTED AUDIBLE SIGNALING APPLIANCES SHALL HAVE THEIR HEIGHTS ABOVE THE FINISHED FLOOR AT NOT LESS THAN 80" TO FINISHED FLOOR AND AT NOT LESS THEN 6" TO FINISHED CEILING, AS CEILING HEIGHT PERMITS (NFPA 72, 2016, CH. 18.4.8.1). ALL WALL MOUNTED VISUAL APPLIANCES AND COMBINATION AUDIBLE/VISUAL APPLIANCES SHALL BE MOUNTED SUCH THAN THE ENTIRE LENS IS NOT LESS THAN 80" AND NOT GREATER THAN 96" ABOVE FINISHED FLOOR (NFPA 72, 2016, CH. 18.5.5.1).
2. DO NOT DEVIATE FROM CONDUIT RUNS AS SHOWN ON FLOOR PLANS WITHOUT PRIOR APPROVAL FROM SYSTEM SUPPLIER / ENGINEER. FACTORS SUCH AS EXCESSIVE VOLTAGE DROP, ADDITIONAL PARTS, ENGINEERING, ETC. THAT ARE A RESULT OF CONDUIT RUN DEVIATIONS SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
3. DETECTORS SHALL NOT BE LOCATED IN A DIRECT AIR-FLOW, NOR CLOSER THAN 3 FEET (915 mm) FROM ANY AIR SUPPLY DIFFUSER.
4. THE AUDIBLE ALARM NOTIFICATION APPLIANCES SHALL PROVIDE A SOUND PRESSURE LEVEL OF 15 dBA ABOVE THE AVERAGE AMBIENT SOUND LEVEL OR 5 dBA ABOVE THE MAXIMUM SOUND LEVEL HAVING DURATION OF AT LEAST 60 SECONDS, WHICH IS GREATER, IN EVERY OCCUPIED SPACE WITHIN THE BUILDING. THE MINIMUM SOUND PRESSURE LEVEL SHALL BE 60 dBA PER CFC 907.5.2.1.1.
5. THE VOICE/ALARM COMMUNICATION SYSTEM VOICE MESSAGE SHALL COMPLY WITH NFPA 72 SECTIONS 18.4 AND 24.4 FOR GENERAL REQUIREMENTS, INTELLIGIBILITY, AUDIBILITY, MESSAGE PRIORITY, TONES, ETC. REFER TO NFPA 72 ANNEX D, D.1 THROUGH D.6 FOR DETERMINING THE FUNDAMENTALS OF TEST PROTOCOL AND METHOD OF MEASURING INTELLIGIBILITY.
6. FIRE ALARM SYSTEM UTILIZES A COMPLETE COVERAGE, FULLY AUTOMATIC SYSTEM. PROVIDE RELAY MODULE(S) AT FATC/FACP LOCATIONS FOR CONTROL OF HVAC SHUT DOWN, SMOKE/FIRE DAMPER CLOSURE AND DOOR HOLD RELEASES.
7. THE EXISTING CAMPUS FIRE ALARM SYSTEM SHALL BE MAINTAINED AND OPERATIONAL AT ALL TIMES DURING ALTERATIONS AND CONSTRUCTION. WHEN PORTIONS OF THE SYSTEM REQUIRE ALTERATIONS, THE REMAINDER OF THE SYSTEM SHALL BE KEPT IN SERVICE. IF NECESSARY TO SHUT DOWN ENTIRE FIRE ALARM SYSTEM, CONTRACTOR SHALL PROVIDE FIREWATCH FOR ALL OCCUPIED AREAS OF WORK UNTIL THE FIRE ALARM SYSTEM IS RETURNED TO OPERATIONAL SERVICE. FIREWATCH AND SYSTEM/EQUIPMENT IDENTIFICATION SHALL BE PER THE 2016 CFC, CHAPTER 33. LOCAL FIRE AUTHORITY AND OWNER SHALL BE NOTIFIED 48 HOURS IN ADVANCE OF ANY SHUT DOWN.
8. SPRINKLER PROTECTION PROVIDED IN ALL ABOVE CEILING, ATTIC SPACES AND CONCEALED COMBUSTIBLE AREAS PER CBC/CFC 903.2.3 AND 907.2.3.6.1. HEAT DETECTORS NOT PROVIDED ABOVE CEILING. PROVIDE HEAT DETECTORS WHERE FIRE SPRINKLERS HAVE BEEN OMITTED PER 2016 NFPA 72 AND 2016 NFPA 13.

VOLTAGE DROP CALCULATIONS
BEAR CREEK HS AGRISCIENCE

DEVICE	UL MAX. CURRENT AMPS	NO	VISUAL CIRCUIT V1	NO	VISUAL CIRCUIT SPARE	NO	VISUAL CIRCUIT SPARE	NO	VISUAL CIRCUIT SPARE
STROBE (CEILING) 15 CD	0.041	2	0.082		0.000		0.000		0.000
STROBE (CEILING) 30 CD	0.063	1	0.063		0.000		0.000		0.000
STROBE (CEILING) 75 CD	0.111	4	0.444		0.000		0.000		0.000
STROBE (CEILING) 95 CD	0.134	0	0.000		0.000		0.000		0.000
			0.000		0.000		0.000		0.000
			0.000		0.000		0.000		0.000
TOTAL CURRENT ON CIRCUIT			0.589 AMPS		0.000 AMPS		0.000 AMPS		0.000 AMPS
TOTAL WIRE LENGTH IN FEET			225						
% VOLTAGE DROP			**2.15**		**0.00**		**0.00**		**0.00**
WIRE SIZE			#12		#12		#12		#12
CIRCUIT LOCATION			FAPS		FAPS		FAPS		FAPS
VOLTS DROPPED			**0.44**		**0.00**		**0.00**		**0.00**

VOLTAGE DROP CALCULATIONS
BEAR CREEK HS AGRISCIENCE

DEVICE	UL MAX. CURRENT AMPS	NO	AUDIBLE CIRCUIT A1	NO	AUDIBLE CIRCUIT SPARE	NO	AUDIBLE CIRCUIT SPARE	NO	AUDIBLE CIRCUIT SPARE
SPEAKER 1/4W	0.004	2	0.008		0.000		0.000		0.000
SPEAKER 1/2W	0.007	1	0.007		0.000		0.000		0.000
SPEAKER 1W	0.014	4	0.056		0.000		0.000		0.000
SPEAKER 2W (WEATHERPROOF)	0.028	4	0.112		0.000		0.000		0.000
			0.000		0.000		0.000		0.000
			0.000		0.000		0.000		0.000
TOTAL CURRENT ON CIRCUIT			0.168 AMPS		0.000 AMPS		0.000 AMPS		0.000 AMPS
TOTAL WIRE LENGTH IN FEET			300						
% VOLTAGE DROP			**2.07**		**0.00**		**0.00**		**0.00**
WIRE SIZE			#16		#16		#16		#16
CIRCUIT LOCATION			AMP		AMP		AMP		AMP
VOLTS DROPPED			**0.42**		**0.00**		**0.00**		**0.00**

VOLTAGE DROP CALCULATIONS GENERAL NOTES:

1. THE LISTED MANUFACTURER OPERATING VOLTAGE RANGE FOR EQUIPMENT AND DEVICES ARE AS FOLLOWS:

   DEVICES = 16 - 33 VDC
   EQUIPMENT = +24VDC FILTERED, REGULATED
   BATTERY = 20.4 VDC END OF USEFUL LIFE PER NFPA 72 HANDBOOK AND UL 864.

2. VOLTAGE DROP PERCENT FORMULA:

$$\frac{\text{WIRE LENGTH x TOTAL CURRENT AMPS x 21.6}}{\text{CIRCULAR MILS}} \times \frac{100}{20.4}$$

   21.6 = CONSTANT (RESISTANCE OF CONDUCTOR)

   CIRCULAR MILS:
   #12AWG = 6530 #16AWG = 2580
   #14AWG = 4110 #18AWG = 1620

BATTERY SIZING CALCULATION

PROJECT NAME: BEAR CREEK HS AGRISCIENCE
PANEL LOCATION: EXISTING ADMIN BLDG H
DATE PERFORMED: November 15, 2023

(E) FACP AM02-117196

QTY.	DEVICE NAME	STD-BY (AMPS)		ALARM (AMPS)	
	EXISTING SLC LOAD	0.1702	0.1702	0.9891	0.9891
	EXISTING AUD/VIS LOAD	0.0000	0.0000	0.9340	0.9340
9	SMOKE DETECTOR	0.0003	0.0027	0.0003	0.0027
4	MULTI-CRITERIA DETECTOR	0.0003	0.0012	0.0003	0.0012
4	SOUNDER BASE	0.0003	0.0012	0.0003	0.0012
5	HEAT DETECTOR (ATTIC)	0.0003	0.0015	0.0003	0.0015
2	SPRINKLER MONITORING	0.0004	0.0008	0.0006	0.0012
5	CONTROL RELAY MODULE	0.0003	0.0015	0.0003	0.0015
		0.0000	0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000	0.0000
	TOTALS =		0.1791		1.9324

STAND-BY LOAD = 0.1791 ALARM LOAD = 1.9324 AMPS
STAND-BY TIME = 24 ALARM TIME = 15 / 60 HRS
STAND-BY = 4.2972 ALARM = 0.4831 AMP HRS
TOTAL = STAND-BY + ALARM
= 4.30 + 0.48
= 4.78 Ah (AMP HRS)
MULTIPLY BY DERATING FACTOR OF 1.25 = 5.98 Ah (AMP HRS)

MINIMUM BATTERY SIZE = 5.98 AMPERE HOURS
PROVIDE NEW BATTERIES AS REQUIRED FOR EXISTING AND NEW LOADS

BATTERY SIZING CALCULATION

PROJECT NAME: BEAR CREEK HS AGRISCIENCE
PANEL LOCATION: NEW AGRISCIENCE BLDG
DATE PERFORMED: September 12, 2022

FAPS

QTY.	DEVICE NAME	STD-BY (AMPS)		ALARM (AMPS)	
1	POWER SUPPLY	0.0750	0.0750	0.1750	0.1750
2	15cd STROBE (CEILING)	0.0000	0.0000	0.0410	0.0820
1	30cd STROBE (CEILING)	0.0000	0.0000	0.0630	0.0630
4	75cd STROBE (CEILING)	0.0000	0.0000	0.1110	0.4440
0	95cd STROBE (CEILING)	0.0000	0.0000	0.1340	0.0000
1	SYNC MODULE	0.0000	0.0000	0.0100	0.0100
		0.0000	0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000	0.0000
	TOTALS =		0.0750		0.7740

STAND-BY LOAD = 0.0750 ALARM LOAD = 0.7740 AMPS
STAND-BY TIME = 24 ALARM TIME = 15 / 60 HRS
STAND-BY = 1.8000 ALARM = 0.1935 AMP HRS
TOTAL = STAND-BY + ALARM
= 1.80 + 0.19
= 1.99 Ah (AMP HRS)
MULTIPLY BY DERATING FACTOR OF 1.25 = 2.49 Ah (AMP HRS)

MINIMUM BATTERY SIZE = 2.49 AMPERE HOURS
PROVIDE MIN. (2) 7.00 Ah 12VDC BATTERIES AS REQUIRED FOR 24VDC OPERATION

BATTERY SIZING CALCULATION

PROJECT NAME: BEAR CREEK HS AGRISCIENCE
PANEL LOCATION: NEW AGRISCIENCE BLDG
DATE PERFORMED: September 12, 2022

FAPS

QTY.	DEVICE NAME	STD-BY (AMPS)		ALARM (AMPS)	
1	AMPLIFIER	0.0510	0.0510	6.5000	6.5000
2	SPEAKER (1/4W)	0.0000	0.0000	0.0035	0.0070
1	SPEAKER (1/2W)	0.0000	0.0000	0.0071	0.0071
4	SPEAKER (1W)	0.0000	0.0000	0.1420	0.5680
4	WP SPEAKER (2W)	0.0000	0.0000	0.0283	0.1132
1	SYNC MODULE	0.0000	0.0000	0.0100	0.0100
		0.0000	0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000	0.0000
	TOTALS =		0.0510		7.2053

STAND-BY LOAD = 0.0510 ALARM LOAD = 7.2053 AMPS
STAND-BY TIME = 24 ALARM TIME = 15 / 60 HRS
STAND-BY = 1.2240 ALARM = 1.8013 AMP HRS
TOTAL = STAND-BY + ALARM
= 1.22 + 1.80
= 3.03 Ah (AMP HRS)
MULTIPLY BY DERATING FACTOR OF 1.25 = 3.78 Ah (AMP HRS)

MINIMUM BATTERY SIZE = 3.78 AMPERE HOURS
PROVIDE MIN. (2) 7.00 Ah 12VDC BATTERIES AS REQUIRED FOR 24VDC OPERATION

BATTERY CALCULATIONS GENERAL NOTE:

1. CONTRACTOR TO PROVIDE BATTERY MANUFACTURER DATE STAMP PER NFPA 72. TYPICAL FOR ALL CONTROL PANELS, POWER SUPPLY PANELS AND AUDIO AMPLIFIER PANELS.

FIRE ALARM SYSTEM CALCULATIONS

SCALE: N.T.S.

2

COMPLETE FIRE ALARM SUBMITTAL

AUTOMATIC ADDRESSABLE FIRE ALARM SYSTEM WITH EMERGENCY VOICE/ALARM COMMUNICATION SYSTEM

OWNER: Lodi Unified School District

PROJECT NAME: Bear Creek High School Agriculatural Science Bulding Inc. 2

CLIENT ADDRESS: 10555 THORTON RD., STOCKTON, CA 95209

REGISTERED PROFESSIONAL ENGINEER RAYMOND W. SIMONITE No. E15610 12/31/2023 ELECTRICAL STATE OF CALIFORNIA

REVISIONS:

	DESCRIPTION	DATE
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PROJECT NO: 2022-40112
DATE ISSUED: 02.09.2023
SCALE: None

EFA0.3

FIRE ALARM RISER DIAGRAM & SYSTEM CALCULATIONS

tk1sc COLLABORATIVE
11870 Pierce Street, Suite 160
Riverside, California 92505
951.299.4160 www.tk1sc.com
Project Leader - Bill Voller
Electrical Lead - Nick Bruno
tk1sc Job #: B2202912.000

PLAN NOTES:

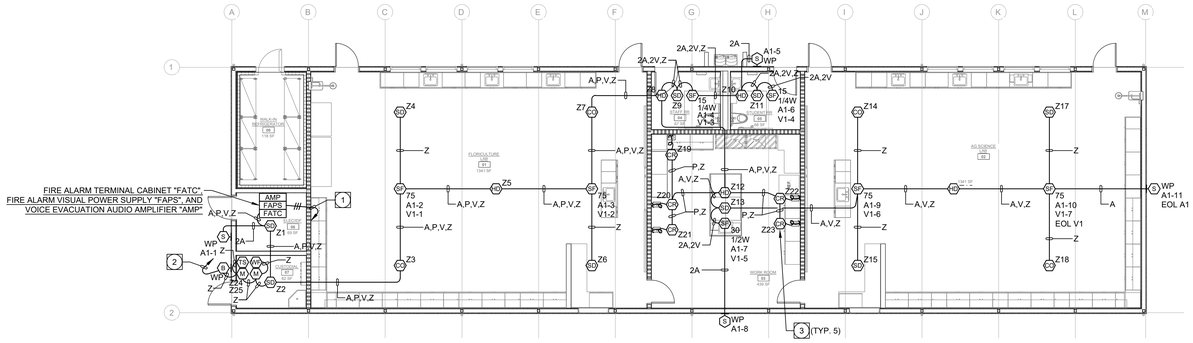
1. PROVIDE 3/4"C. WITH 3#12, 1#12 GRD. TO TWO (2) 120V DEDICATED CIRCUITS AT BUILDING PANEL 'AGS' FOR POWER. PROVIDE TWO (2) 20AMP, 1-POLE CIRCUIT BREAKERS WITH APPROVED LOCK-ON DEVICES, RED INDICATORS AND IDENTIFIED AS "FIRE ALARM CONTROL CIRCUIT" (NFPA 72, 10.6). CONNECT AS REQUIRED. PROVIDE ALL REQUIRED MOUNTING HARDWARE. MATCH A.I.C. RATING OF DEVICES USED.

2. PROVIDE 3/4"C. WITH 2#12, 1#12 GRD. TO 120V DEDICATED CIRCUIT AT BUILDING PANEL 'AGS' FOR POWER. PROVIDE 20AMP, 1-POLE CIRCUIT BREAKER WITH APPROVED LOCK-ON DEVICE, RED INDICATOR AND IDENTIFIED AS "FIRE ALARM CONTROL CIRCUIT" (NFPA 72, 10.6). CONNECT AS REQUIRED. PROVIDE ALL REQUIRED MOUNTING HARDWARE. MATCH A.I.C. RATING OF DEVICES USED.

3. CONNECT TO COMBINATION SMOKE/FIRE DAMPER PER MANUFACTURER'S REQUIREMENTS. VERIFY EXACT LOCATION PRIOR TO ROUGH-IN.

FIRE ALARM PLAN GENERAL NOTES:

1. NOTIFICATION DEVICES IN ROOMS CONTAINING (2) OR MORE AUDIBLE AND/OR (2) OR MORE VISUAL DEVICES SHALL BE SYNCHRONIZED PER NFPA 72. THIS SHALL INCLUDE AUDIBLE AND VISUAL DEVICES LOCATED IN ADJACENT/ADJOINING SPACES.
2. DO NOT DEVIATE FROM CONDUIT RUNS AS SHOWN ON FLOOR PLANS WITHOUT PRIOR APPROVAL FROM SYSTEM SUPPLIER / ENGINEER. FACTORS SUCH AS EXCESSIVE VOLTAGE DROP, ADDITIONAL PARTS, ENGINEERING, ETC. THAT ARE A RESULT OF CONDUIT RUN DEVIATIONS SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
3. DETECTORS SHALL NOT BE LOCATED IN A DIRECT AIR-FLOW, NOR CLOSER THAN 3 FEET (915 mm) FROM ANY AIR SUPPLY DIFFUSER.
4. THE AUDIBLE ALARM NOTIFICATION APPLIANCES SHALL PROVIDE A SOUND PRESSURE LEVEL OF 15 dBA ABOVE THE AVERAGE AMBIENT SOUND LEVEL OR 5 dBA ABOVE THE MAXIMUM SOUND LEVEL HAVING DURATION OF AT LEAST 60 SECONDS, WHICHEVER IS GREATER, IN EVERY OCCUPIED SPACE WITHIN THE BUILDING PER CFC SECTION 907.5.2.1.1. THE MINIMUM SOUND PRESSURE LEVEL SHALL BE 60 dBA PER NFPA 72, TABLE A.18.4.3.
5. THE VOICE/ALARM COMMUNICATION SYSTEM VOICE MESSAGE SHALL COMPLY WITH NFPA 72 SECTIONS 18.4 AND 24.4 FOR GENERAL REQUIREMENTS, INTELLIGIBILITY, AUDIBILITY, MESSAGE PRIORITY, TONES, ETC. REFER TO NFPA 72 ANNEX D, D.1 THROUGH D.6 FOR DETERMINING THE FUNDAMENTALS OF TEST PROTOCOL AND METHOD OF MEASURING INTELLIGIBILITY.
6. REFER TO ARCHITECTURAL EXTERIOR ELEVATIONS FOR PRECISE DEVICE LOCATIONS.
7. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATION OF ALL CEILING MOUNTED DEVICES.
8. IF SHIELDED WIRE IS USED, THE FOLLOWING MUST BE OBSERVED.
   A. METALLIC CONTINUITY OF THE SHIELD MUST BE MAINTAINED AND INSULATED THROUGHOUT THE ENTIRE LENGTH OF THE CABLE.
   B. THE ENTIRE LENGTH OF THE CABLE MUST HAVE A RESISTANCE GREATER THAN 1 MEGOHM TO EARTH.
9. ALL PENETRATIONS THROUGH FIRE RATED WALLS SHALL BE PROTECTED FROM THE SPREAD OF FIRE WITH AN APPROVED FIRE STOP SYSTEM EQUAL TO OR GREATER THAN THE FIRE RATING OF THE STRUCTURE / SURFACE BEING PENETRATED AS IDENTIFIED IN CBC CHAPTER 7, UL OR OTHER LAB TESTING CRITERIA. APPROVED TYPES OF MATERIALS SHALL BE IDENTIFIED WITHIN THE FIRE ALARM SECTION OF THE PROJECT SPECIFICATIONS.
10. A SYSTEM GROUND MUST BE PROVIDED FOR EARTH DETECTION AND LIGHTNING PROTECTION DEVICES. THIS CONNECTION SHALL BE MADE TO AN APPROVED DEDICATED EARTH CONNECTION PER CEC, ARTICLE 250.
11. WIRING IN DUCTS, PLENUMS AND OTHER AIR HANDLING SPACES MUST BE INSTALLED IN ACCORDANCE WITH CEC.
12. UNDERGROUND WIRING MUST BE FREE OF ALL WATER.
13. ALL FIRE ALARM SYSTEM CONDUCTORS SHALL BE RUN IN A DEDICATED FIRE ALARM CONDUIT SYSTEM.
14. WHERE A DETECTOR IS INDICATED TO BE INSTALLED ABOVE THE CEILING AND NO ACCESS TO THE CEILING SPACE EXISTS, THE ELECTRICAL CONTRACTOR SHALL FURNISH ACCESS PANELS. THE DETECTOR SHALL BE EASILY ACCESSIBLE AND THE LOCATION OF THE DETECTOR SHALL BE CLEARLY MARKED.
15. COORDINATE ALL FIRE ALARM DEVICES, ESPECIALLY REMOTE LED'S FOR DUCT SMOKE DETECTORS, WITH ARCHITECT PRIOR TO ROUGH-IN.
16. WIRING OTHER THAN THAT CONNECTED TO ELEVATOR CABS MUST NOT BE RUN IN ELEVATOR SHAFTS (REF. CEC, ARTICLE 620).
17. FIRE ALARM SYSTEM UTILIZES A COMPLETE COVERAGE, FULLY AUTOMATIC SYSTEM. PROVIDE RELAY MODULE(S) AT FATC/FACP LOCATIONS FOR CONTROL OF HVAC SHUT DOWN, SMOKE/FIRE DAMPER CLOSURE AND DOOR HOLD RELEASES.
18. WHERE NEW DEVICES (AND ASSOCIATED CONDUIT) CANNOT PHYSICALLY BE MOUNTED CONCEALED IN WALLS, RUN IN PANDUIT SURFACE RACEWAY/WIREWAY (AND DEVICES SHALL BE MOUNTED ON SURFACE OUTLET BOXES). REFER TO SPECIFICATIONS. PROVIDE SIZE OF RACEWAY TO ACCOMMODATE THE REQUIRED CONDUCTORS. WHERE CONDUIT IS INDICATED, PROVIDE SURFACE RACEWAY WITH AN EQUAL CROSS SECTION TO THE DIAMETER OF THE CONDUIT INDICATED.
19. DETECTOR SENSITIVITY SHALL BE TESTED USING MANUFACTURER'S CALIBRATED SENSITIVITY INSTRUMENT OR OTHER CALIBRATED TESTING METHOD. (CFC, SECTIONS 907.8.3 AND 907.8.4)
20. UPON DETECTION OF CARBON MONOXIDE THE FIRE ALARM SYSTEM SHALL PRODUCE A FOUR-PULSE TEMPORAL PATTERN SIGNAL WITHIN THE BUILDING AND COMPLY WITH NFPA 720, SECTION 5.8.6.5.
21. THE EXISTING CAMPUS FIRE ALARM SYSTEM SHALL BE MAINTAINED AND OPERATIONAL AT ALL TIMES DURING ALTERATIONS AND CONSTRUCTION. WHEN PORTIONS OF THE SYSTEM REQUIRE ALTERATIONS, THE REMAINDER OF THE SYSTEM SHALL BE KEPT IN SERVICE. IF NECESSARY TO SHUT DOWN ENTIRE FIRE ALARM SYSTEM, CONTRACTOR SHALL PROVIDE FIREWATCH FOR ALL OCCUPIED AREAS OF WORK UNTIL THE FIRE ALARM SYSTEM IS RETURNED TO OPERATIONAL SERVICE. FIREWATCH AND SYSTEM/EQUIPMENT IDENTIFICATION SHALL BE PER THE 2016 CFC, CHAPTER 14. LOCAL FIRE AUTHORITY AND OWNER SHALL BE NOTIFIED 48 HOURS IN ADVANCE OF ANY SHUT DOWN.



VOICE EVACUATION SPEAKER NOTE:
- ALL INTERIOR SPEAKERS SHALL BE TAPPED AT 1 WATT, U.O.N.
- ALL EXTERIOR SPEAKERS SHALL BE TAPPED AT 2 WATTS, U.O.N.

FIRE ALARM PLAN | 1/8" = 1'-0" | **1**

COMPLETE FIRE ALARM SUBMITTAL

AUTOMATIC ADDRESSABLE FIRE ALARM SYSTEM WITH EMERGENCY VOICE/ALARM COMMUNICATION SYSTEM

OWNER: Lodi Unified School District

PROJECT NAME: Bear Creek High School Agriculatural Science Bulding Inc. 2

CLIENT ADDRESS: 10555 THORTON RD., STOCKTON, CA 95209

REGISTERED PROFESSIONAL ENGINEER RAYMOND W. SIMONIS No. E15610 12/31/2023 ELECTRICAL STATE OF CALIFORNIA

REVISIONS:

	DESCRIPTION	DATE
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PROJECT NO: 2022-40112

DATE ISSUED: 02.09.2023

SCALE: As Indicated

EFA1.0

FIRE ALARM PLAN

tk1sc COLLABORATIVE
11870 Pierce Street, Suite 160
Riverside, California 92505
951.299.4160 www.tk1sc.com

Project Leader - Bill Voller
Electrical Lead - Nick Bruno
tk1sc Job #: B2202912.000

TREE LEGEND

(USDA ZONE 9)(SUNSET 9)

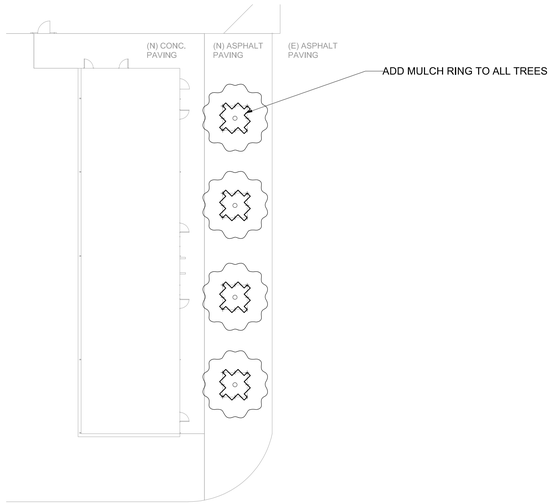
SYM.	BOTANICAL NAME	COMMON NAME	SIZE	QTY.	WUCOLS
⊕	LAGERSTROEMIA INDICA 'WATERMELON RED'	CRAPE MYRTLE	36" BOX	4	MODERATE

ROOT BARRIER NOTE

BARRIER LENGTH SHALL BE MINIMUM 5'-0" EACH WAY FROM THE CENTER OF TREE TRUNK ALONG HARDSCAPE. ALL TREES SHALL BE PLANTED WITH 18" LINEAR ROLL ROOT BARRIER.

GENERAL PLANTING NOTES

1. REFER TO THE WRITTEN SPECIFICATION.
2. ALL BOXED TREES WILL BE SELECTED AND TAGGED BY THE LANDSCAPE DESIGNER. CONTACT LANDSCAPE DESIGNER FOR NAME OF WHOLESALE NURSERY.
3. ANY TREE INDICATED ON A PLAN SHOULD BE CONSIDERED DIAGRAMMATIC. ALL LOCAL JURISDICTION STANDARDS AND SPECIFICATIONS SHOULD BE REVIEWED PRIOR TO PLANTING.
4. THE CONTRACTOR SHALL VERIFY ALL PLANT MATERIAL QUALITY AND QUANTITIES PRIOR TO INSTALLATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTINUOUS PROTECTION OF ALL PLANT MATERIALS UPON ARRIVAL TO THE SITE. ALL TREES, SHRUBS, VINES AND GROUNDCOVERS SHALL BE SPOTTED UNDER THE DIRECTION OF THE LANDSCAPE DESIGNER AND BUILDER REPRESENTATIVE.
5. CONTRACTOR IS TO SPOT ALL PLANT MATERIAL AND HAVE THE LANDSCAPE DESIGNER APPROVE LOCATION PRIOR TO EXCAVATION OF ANY PLANT PIT. ALLOW 48 HOURS LEAD TIME. ANY TREE, SHRUB OR VINE THAT IS PLANTED WITHOUT APPROVAL OF THE LANDSCAPE DESIGNER MAY BE MOVED AT THE CONTRACTOR'S EXPENSE. CONTACT: JONATHAN STALVEY - 949.872.3074
6. THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR THE CORRECT HEIGHT OF ROOT BALL ABOVE GRADE.
7. ADJUST TREE LOCATIONS IF THERE IS A CONFLICT WITH SUBSURFACE DRAIN LINES OR STORM DRAINS.
8. ALL SPECIMEN TREES ARE TO BE FINE PRUNED AFTER PLANTING, UNDER SUPERVISION OF LANDSCAPE ARCHITECT.
9. THIRTY (30) DAYS AFTER INSTALLATION, ALL LANDSCAPE AREAS SHALL BE FERTILIZED WITH A COMMERCIAL GRADE FERTILIZER OF 16-6-8 OR APPROVED EQUAL, APPLIED PER MANUFACTURER'S RECOMMENDATIONS AND SPECIFICATIONS. FERTILIZER APPLICATION SHALL BE CONTINUOUS THEREAFTER AT MONTHLY INTERVALS.
10. DURING THE LAST 30 DAYS OF MAINTENANCE, THE BUILDER IS RESPONSIBLE FOR OBTAINING AS-BUILTS, CONTROLLER CHARTS AND WATER SCHEDULES FROM THE LANDSCAPE CONTRACTOR. THREE (3) COPIES ARE TO BE SUBMITTED TO THE MASTER OR SUB ASSOCIATION AND MAINTENANCE CONTRACTOR.
11. INSTALL 12" DIAMETER MINIMUM MULCH RING AROUND THE BASE OF TREES PLANTED WITHIN TURF AREAS.
12. CONTRACTOR SHALL COVER ALL PLANTING AREAS WITH A 3" LAYER OF SHREDDED BARK MULCH.
13. ALL LANDSCAPE AREAS SHALL SHEET FLOW @ 2% MINIMUM OR DRAIN TO AREA. DRAINS @ 1% MINIMUM PER CIVIL ENGINEERING PLANS.
14. ALL TREES THAT ARE CLOSER THAN FIVE FEET (5') TO HARDSCAPE ELEMENTS SHALL BE PLANTED WITH AN OWNER AND AGENCY APPROVED LINEAR ROOT BARRIER.
15. SUBMIT MULCH SAMPLE WITH HORTICULTURAL SOILS REPORT PRIOR TO DELIVERY.
16. (⟋) TYP. FLOWLINE/DIRECTION OF DRAINAGE @ 1% MIN. SEE CIVIL ENG. PLANS.



PLANTING PLAN

IRRIGATION UTILITIES

	POC	DOMESTIC SERVICE LINE BY OTHERS. VERIFY LOCATION IN THE FIELD
	EXISTING	EXISTING BACKFLOW, PROTECT-IN-PLACE
M	EXISTING	EXISTING METER, PROTECT-IN-PLACE
	AS APPROVED	GATE VALVE - BLOCKED TRUE UNION PVC - 2" & SMALLER (LOCATE IN PLANTING AREAS - SHOWN FOR CLARITY ONLY)
	RAINBIRD	XCZ-100-PRB-COM WIDE FLOW DRIP CONTROL KIT FOR COMMERCIAL APPLICATIONS, 1IN. BALL VALVE WITH 1IN. PESB VALVE AND 1IN. PRESSURE REGULATING 40PSI QUICK-CHECK BASKET FILTER, 0.3 GPM-20 GPM

IRRIGATION CONTROLLER

R	RAINBIRD	ESPLXME2-LXMM, TRADITIONALLY-WIRED, COMMERCIAL CONTROLLER. INSTALL IN WALL-MOUNTED METAL PEDESTAL.
E	120 VOLT ELECTRICAL POWER for CONTROLLER	PROVIDED BY ELECTRICIAN, FIELD VERIFY ACTUAL LOCATION.

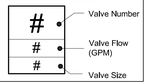
IRRIGATION COMPONENTS

	RAINBIRD	RWSB1402- RAIN BIRD RWS (2 PER TREE)

IRRIGATION PIPING

	AS APPROVED	EXISTING MAINLINE TO REMAIN - PROTECT AND MAINTAIN.
	AS APPROVED	NEW MAINLINE AND CONTROL WIRES - FIELD VERIFY LOCATION, SIZE, AND DEPTH OF TIE-INS TO EXISTING MAINLINE. SIZE TO MATCH EXISTING. LOCATED IN PLANTING AREAS. BURY MIN. 24" BELOW GRADE.
	AS APPROVED	NON-PRESSURE LATERAL SCH. 40 PVC PIPE. FOR SIZES 3/4" - 2" W/ PVC SCH. 40 FITTINGS - BURY MIN. 12" BELOW GRADE, SEE DETAIL FOR SLEEVING AND DEPTHS. SEE PLAN FOR SLEEVING LOCATIONS. SEE PLAN FOR PIPE SIZES.
	AS APPROVED	PVC PIPE SCH. 40 SLEEVING, TWICE THE DIAMETER OF PIPE OR WIRE BUNDLE CARRIED - EXTEND 18" BEYOND EDGE OF PAVING & PLACE BELOW ALL PAVING, HARDSCAPE, ETC., AND AS DIRECTED BY OWNER'S AUTHORIZED REPRESENTATIVE.

VALVE KEY:



DRIPLINE SUPPLY/EXHAUST LATERAL PIPE SIZING:

ZONE FLOW	PIPE SIZE
0 - 5 GPM	DRIPLINE TUBING or 1/2" PVC
5 - 8 GPM	3/4" PVC
8.1 - 13 GPM	1" PVC
13.1 - 22 GPM	1 1/4" PVC
22.1 - 30 GPM	1 1/2" PVC

IRRIGATION MISCELLANEOUS EQUIPMENT

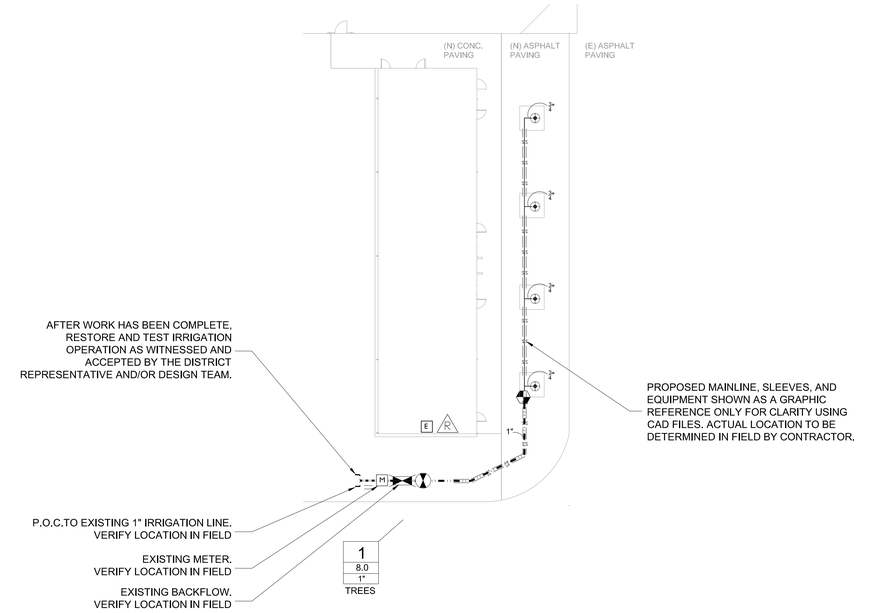
NO SYMBOL	AS APPROVED	IRRIGATION 'COMMON' WIRE #14UF AWG DIRECT BURIAL (U.L. APPROVED)
NO SYMBOL	AS APPROVED	IRRIGATION 'CONTROL' WIRE #14UF AWG DIRECT BURIAL (U.L. APPROVED)
NO SYMBOL	AS APPROVED	IRRIGATION 'SPARE' WIRE #14UF AWG DIRECT BURIAL (U.L. APPROVED)
NO SYMBOL	3M	DBR/Y-6 DIRECT BURIAL WATER-PROOF WIRE CONNECTORS FOR USE ON ALL WIRE CONNECTIONS
NO SYMBOL	RAINBIRD	OPERIND DRIP SYSTEM OPERATION INDICATOR, STEM RISES 6IN. FOR CLEAR VISIBILITY WHEN DRIP SYSTEM IS CHARGED TO A MINIMUM OF 20PSI. INCLUDES 16IN. OF 1/4IN. DISTRIBUTION TUBING WITH CONNECTION FITTING PRE-INSTALLED.

IRRIGATION POINT-OF-CONNECTION NOTES:

1. CONNECT PROPOSED IRRIGATION MAINLINE TO EXISTING IRRIGATION MAINLINE IN THIS APPROXIMATE LOCATION. CONTRACTOR SHALL ROUTE NEW CONTROL WIRES FROM EXISTING CONTROLLER TO THE PROPOSED VALVES AND REPAIR AND REPLACE ANY DAMAGE AS RESULTING FROM TRENCHING, WIRE ROUTING, ETC.

NOTES:

1. AFTER WORK HAS BEEN COMPLETE, RESTORE AND TEST IRRIGATION OPERATION AS WITNESSED AND ACCEPTED BY THE DISTRICT REPRESENTATIVE AND/OR DESIGN TEAM.
2. AREAS WHERE NEW DEVELOPMENT ARE TAKING PLACE AND EXISTING IRRIGATION WILL BE IMPACTED, RELOCATE IRRIGATION COMPONENTS, CAP AND REPAIR ANY DAMAGE AND REDISTRIBUTE IRRIGATION SPRAY HEADS TO MAINTAIN HEAD-TO-HEAD COVERAGE.



IRRIGATION PLAN

NORTH

0 20 40 60 feet

SCALE: 1" = 20'

OWNER: Lodi Unified School District

PROJECT NAME: Bear Creek High School Agriculatural Science Bulding Inc. 2

CLIENT ADDRESS: 10555 THORTON RD., STOCKTON, CA 95209

LICENSED ARCHITECT
ROBERT M. SIMONS
No. C-18301
JAN. 31. 2025
STATE OF CALIFORNIA

REVISIONS:

	DESCRIPTION	DATE
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PROJECT NO: 2022-40112

DATE ISSUED: Issue Date

SCALE:

LS-101

LANDSCAPE IRRIGATION & PLANTING PLAN

Description	Site Contractor	JL Modular (JLM)	District	Comments
Division 1 - General Requirements:				
Temporary facilities:				
Temporary site fencing	X			
Portable toilets	X	X		Each contractor provide toilets for their own use
Field office for Inspector and CM	X			
Temporary power service	X			
Temporary water	X			
Survey, staking and layout for all Increment 1 site improvements.	X			
Division 3 - Concrete				
All Building Concrete		X		
Foundation staking and layout		X		
Dig footings and Off-haul Spoils		X		
Footings & Building Slabs		X		
backfill to foundation		X		
Division 9 - Finishes				
All painting associated with the site work	X			
All painting associated with the buildings		X		
Division 22 - Plumbing				
All building plumbing (gas, sewer, domestic water, HVAC condensate lines and condensate drywells)		X		JLM extends sewer, domestic water and gas 5' from building with cleanout/SOV and christy box.
Site Water	X			The utilities contractor shall make final connections.
Site Gas	X			The utilities contractor shall make final connections.
Site Sanitary Sewer	X			The utilities contractor shall make final connections.
RWL's site storm drainage	X			
Division 23 - HVAC				

Description	Site Contractor	JL Modular (JLM)	District	Comments
All Building HVAC Systems		X		
Division 25 Integrated Automation				
HVAC Controls		X		
HVAC/EMS controls and conductors. Connect to existing system and programming as required.		X		
Division 26 - Electrical:				
Power & Distribution for the building		X		
Site conduits and pull boxes	X			JLM will extend conduits 5" from the building. Site contractor to make final site conduit connection
Conductors from MSB to Building Panel	X			
Main breaker at MSB	X			
All building electrical		X		
Lighting:				
Site Lighting	X			
All Building Lighting		X		
Division 27 - Communications:				
General				
Site conduits and pull boxes	X			
Cabling/fiber from building IDF/electrical room to head-end equipment via site conduits where applicable.	X			JLM to provide building raceways and extend 5' from the building. E&LV contractor is responsible for site conduits and final connection to conduit 5' from the building.
Data:				
All building data	X			
Fiber from building IDF to MDF via site conduits where applicable	X			JLM to provide a building raceway. E&LV contractor to pull fiber via existing raceways and conduits installed by E&LV per increment 1.
Data cabling	X			JLM to provide building raceway

Description	Site Contractor	JL Modular (JLM)	District	Comments
IDF Cabinet	X			
Power for IDF('s)		X		
Clock/Bell/Intercom	X			E&LV contractor to provide recessed backboxes to JLM for installation along with conduits at rough in
Equipment & Cabling	X			
AV Systems				
Blocking for Monitor		X		
Classroom Video Monitor & Mount	X			OFCI
Bldg. Conduit & Back boxes		X		
Classroom AV System	X			
Power for Classroom Video Monitor		X		
Division 28 - Electronic Security and Safety:				
Security Systems:				
Building Security System				scope needs to be confirmed by the district
Conductors to POC via site conduits where applicable.		X		JLM to provide raceways and rough-in boxes. Cabling and devices is not in scope.
Fire Alarm:				
Site conduits and pull boxes	X			JLM to provide building raceways and extend 5' from the building. E&LV contractor is responsible for site conduits and final connection to conduit 5' from the building.
All fire alarm control extender, and annunciator panels	X			Provide recessed device rough in boxes to JLM for installation with in wall conduits.
All conductors and devices	X			JLM to provide all building raceways and rough-in boxes. E&LV contractor to support plenum-rated cabling on "J" hooks above T-bar grid ceilings.
Division 31 - Earthwork:				
Certified Building pad with 5' overbuild	X			
Excavation/backfill	X			
Rough grading	X			

Description	Site Contractor	JL Modular (JLM)	District	Comments
Finish grading	X			
Division 32 - Exterior Improvements				
Asphalt concrete	X			
parking lot Striping and signage	X			
Site Concrete: Mow Strips, Curb and Gutter, Flat Work	X			Earthwork and paving to complete subgrade
Landscaping & Irrigation	X			
Division 33 - Utilities				
Storm Drain:				
Storm Drain to face of building or canopy	X			
Connect RWL to building down spouts	X			
Domestic Water:				
Water service (w/in 5' of Bldgs.)	X			Utility contractor to make final connections approximately 5' from the building
SOV/CO at Buildings		X		
Final connection to Buildings	X			
Chlorination - Site Lines	X			
Chlorination - Building Lines		X		
Sanitary Sewer				
Builing Sewer and extending waste line 5' from building with Clean-out		X		
Site sewer lines from POC to 5' of bldg.	X			
Final connections 5' from Buildings	X			