

Chimacum School District
studio Meng Strazzara

BID SET PROJECT MANUAL

Secure Vestibule Improvements
at 91 West Valley Road,
Chimacum, WA 98325

June 18th, 2021



CHIMACUM
SCHOOL DISTRICT

studio **MENG**
STRAZZARA



COVER SHEET

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PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies demolition, removal, and disposal of surface and subsurface structures, and related ancillary components. Work shall include removal and disposal of all existing materials and equipment as indicated on the Contract Drawings and as needed for a complete installation of all improvements. Variations shall be reported to the Resident Engineer.

1.02 REFERENCES

- A. This Section incorporates by reference the latest revisions of the following documents:
 - 1. Standard plans and specifications of Authority Having Jurisdiction (AHJ)
- B. Definitions
 - 1. Structure: Facilities including but not limited to buildings, bridges, walls, slabs, beams, foundations, footings, piles, foundation systems, pavements, curbs and ramps, loading docks, stairs, canopies, and sidewalks.
 - 2. Asphalt Concrete Pavements: Streets, driveways, alleyways, or other surfaces constructed from bituminous mix, or any combination of bituminous mixes or surface treatments.
 - 3. Concrete Pavements: Streets, driveways, alleyways, or other slabs greater than six inches in thickness, constructed from Portland Cement Concrete, including those constructed with or without an asphaltic overlay.
 - 4. Concrete Sidewalks: Concrete slabs six inches or less in thickness, with or without asphaltic overlay.

1.03 SUBMITTALS

- A. Demolition and Removal Construction Work Plan
 - 1. Waste Management Plan
 - 2. Waste Management Progress Reports
- B. Permits
 - 1. Demolition
 - 2. Hauling and debris disposal
- C. Utility Severance Certificates
- D. Private Property Owner's Release: If material demolished and removed from the site will be deposited on private property, two copies of written releases shall be submitted to Resident Engineer. Releases shall absolve The School District from responsibility concerning the depositing of material on private property, and releases shall be signed by the owners of property on which the material will be deposited.

1.04 DEMOLITION AND REMOVAL CONSTRUCTION WORK PLAN

- A. Work Plan shall include the following:
 - 1. Demolition schedule, including timing for utility disconnects and durations of parking lot or roadway and traffic impacts
 - 2. As-Built Drawing(s) of surveyed locations of disconnected utilities, left on site
 - 3. Description and shop drawings of method and sequence of demolition and removal for all stages
 - 4. Description of equipment types to be used in all demolition and removal operations

5. Description of method and equipment to be used for containment, collection, and salvage, recycling, or disposal of all debris
6. Description of haul routes and access points
7. Field measurements of items and members of the existing structure prior to preparing shop drawings for concrete elements
8. Plans and calculations for false works, prepared by a registered Professional Engineer in the State of Washington, to be used for the existing and new structures
9. Temporary storage locations for doors and frames scheduled to be removed and reused.
10. Description of cleanup methods
11. Waste Management Plan in accordance with Section 01 74 00 Cleaning and Waste Management.

1.05 SITE CONDITIONS

- A. The Contract Drawings are produced from original contract drawings and field observations. Drawings may not fully represent an accurate as-built condition. Drawings of existing conditions are for Contractor's general reference and orientation. Discrepancies may be encountered, and it shall be the Contractor's responsibility to carefully examine and field verify all conditions, including extent of materials remaining in buildings on site.
- B. Surveys and destructive demolition may be performed to locate existing utilities. Drawings shall be prepared to depict existing utilities. Existing utilities to remain shall be protected from damage. Destructive demolitions shall be repaired and finished to match existing condition.
- C. Existing structures and utilities may contain asbestos, lead, PCB or mercury. Hazardous Material-related work is not included in the scope of this Section.
- D. Prior to beginning demolition, Contractor shall make a complete inspection of the project conditions, including existing visible defects. Visible defects shall be photographed and logged by the Contractor and verified by the Resident Engineer.
- E. It is solely the Contractor's responsibility to determine demolition procedures and sequences to ensure the safety of operation. This may include the use of temporary shoring or bracing. If during demolition, damages are made to structures or utilities, repair and restoration shall be promptly performed by the Contractor at no cost to owner.
- F. At completion of demolition, the Contractor shall make examination of exposed components and possible damage caused by demolition work. Examination report shall be submitted to Resident Engineer for approval.
- G. Except for items indicated for salvage or reuse, material removed shall become the Contractor's property and shall be removed from the Site before completion of project.

1.06 PROTECTION AND SECURITY

- A. Attention and protection shall be given to existing structures, utilities, and equipment that are to remain.
- B. Security of existing facilities shall be maintained.

PART 2 - PRODUCTS

2.01 MATERIALS, EQUIPMENT, AND FACILITIES

- A. Products for patching, extending, and matching shall be the same types as those used in existing facility, and in accordance with AHJ requirements.

PART 3 - EXECUTION

3.01 GENERAL

- A. Obtain required permits and licenses. Give required notices for performance and completion of demolition, removal, hauling, disposal of debris, and other permit requirements identified in this Section.
- B. Install temporary chain link fencing to secure all work areas, as indicated on Contract documents.
- C. Perform demolition in accordance with the approved Demolition and Removal Construction Work Plan. Use methods within limitations of governing regulations. Demolition shall be done safely and shall avoid damaging any portions of the Structure that are to remain. Federal, local and state codes, including WAC 296-155 "Safety Standards for Construction Work", Part S "Demolition", shall be observed at all times. The Contractor shall review all Drawings of the existing Structure noted in the Contract.
- D. Exercise pollution controls as specified in Contract documents.
- E. Protect trees and shrubs outside of construction limits and street trees within construction limits.
- F. Demolish and remove existing construction only to the extent required by Contract Drawings.
- G. Cut demolition lines and openings true to dimensions required. Use cutting methods that minimizes damage and disturbance to remaining construction. Provide temporary covers over openings.
- H. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
- I. Do not use cutting torches until work area is cleared of flammable materials. Verify condition and contents within concealed spaces, such as ducts and pipes, before starting flame-cutting operations. Maintain ventilation and keep portable fire-suppression devices nearby, during flame-cutting operations.
- J. Do not use explosives.
- K. Remove and lower framing members to ground, by means to prevent free fall, ground impact, and dust generation.
- L. Avoid overloading existing construction, when placing demolition equipment and removing debris.
- M. When hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, disposal, and protection against exposure to environmental pollution.

3.02 SALVAGE

- A. The school district has performed removal of limited loose furniture, appliances, and other small furnishing items prior to Notice to Proceed for this Contract. Any items remaining in the buildings are to be removed as part of the demolition work.

3.03 PROTECTION

- A. General
 - 1. Protect remaining work and adjacent facilities from damage. Do not interfere with neighboring buildings, facilities, or activities.
 - 2. Perform demolition by means that protect the public, workers, and existing materials.
 - 3. Provide bracing and shoring to maintain the stability of existing facilities and construction.
 - 4. Provide barriers, safety guards, and warning lights near openings and depressions. Operate warning lights from dusk to dawn daily.
 - 5. Provide environmental protection as required by the State of Washington to prevent refuse and waste from entering waterways or utility drains.
- B. Protection of Utilities
 - 1. Protect utilities and pavements from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by the demolition operations.
 - 2. Arrange for and verify temporary termination of utility services encountered and as indicated on the Contract Drawings, in conformance with AHJ.
 - 3. If utility is damaged, immediately notify the Resident Engineer and the utility owner for corrective action.

3.04 DISPOSAL OF DEMOLISHED MATERIALS

- A. Except for items or materials indicated in the Waste Management Plan to be reused, salvaged, recycled, reinstalled, or otherwise indicated to remain The School District's property, the Contractor shall remove and transport demolished materials from Work site and legally dispose.
 - 1. Do not allow demolished materials, including those to be salvaged, recycled, or disposed to accumulate on site. Remove materials from building and work site regularly, so their presence will not create hazardous conditions for workers and the public.
 - 2. Comply with AHJ requirements over handling, removal, hauling, and disposal of materials.
 - 3. Prevent spillage during removal and transporting of materials.
 - 4. Do not burn or bury materials.

3.05 REPLACEMENT AND RESTORATION

- A. When non-scheduled items are demolished or removed, items shall be replaced as directed by the Resident Engineering.
- B. Repair and restore damaged facilities, caused by demolition and operation, to their original conditions or better.
- C. Remove temporary chain link fencing, barriers, and safety guards upon completion of work.

3.06 CLEANING

- A. Maintain a clean and orderly work site.

- B. Clean adjacent facilities; remove dust, dirt, and debris caused by demolition operations. Return adjacent facilities to previously existing or better condition, prior to demolition operations.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 1. Framing with dimension lumber.
 2. Framing with timber.
 3. Framing with engineered wood products.
 4. Wood blocking, cants, and nailers.
 5. Wood furring
 6. Plywood backing panels.

1.03 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Timber: Lumber of 5 inches nominal or greater in least dimension.
- D. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 1. NLGA: National Lumber Grades Authority.
 2. WCLIB: West Coast Lumber Inspection Bureau.
 3. WWPA: Western Wood Products Association.

1.04 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 3. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
 6. Comply with submittal requirements of General Structural Notes for Engineered Wood Products.
- B. Fastener Patterns: Full-size templates for fasteners in exposed framing.
- C. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- D. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
1. Wood-preservative-treated wood.
 2. Fire-retardant-treated wood.
 3. Engineered wood products.
 4. Power-driven fasteners.
 5. Powder-actuated fasteners.
 6. Expansion anchors.
 7. Metal framing anchors.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 3. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.02 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Pressure Treatment of Lumber Above Grade: AWPAs Treatment C2 using waterborne preservative to 0.25 lb/cu ft retention. Preservatives used shall comply with General Structural Notes.
- B. Pressure Treatment of Lumber in Contact with Soil: AWPAs Treatment C2 using waterborne preservative designated in AWPAs C2 as suitable for ground contact use to 0.4 lb/cu ft retention. Preservatives used shall comply with General Structural Notes.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- E. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, ledgers, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
 - 5. Wood floor plates that are installed over concrete slabs.

2.03 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Comply with performance requirements in AWPAs C20 (lumber) and AWPAs C27 (plywood)
 - 1. Use Exterior type for exterior locations and where indicated.
 - 2. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
 - 3. Use Interior Type A, unless otherwise indicated.
- B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings.

2.04 DIMENSION LUMBER FRAMING

- A. Maximum Moisture Content: 19 percent.
- B. Non-Load-Bearing Interior Partitions: No. 2 grade and any of the following species:
 - 1. Hem-fir (north); NLGA.
 - 2. Mixed southern pine; SPIB.
 - 3. Spruce-pine-fir; NLGA.
 - 4. Hem-fir; WCLIB, or WWPA.
 - 5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
 - 6. Northern species; NLGA.
 - 7. Eastern softwoods; NeLMA.

8. Western woods; WCLIB or WWPA.
- C. Load-Bearing Framing, including stud walls, joists, rafters, beams, headers and other miscellaneous load bearing members: See General Structural Notes.
- D. Ceiling Joists (Non-Load-Bearing): No. 2 grade of any species.
- E. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
 1. Species and Grade: As indicated above for load-bearing framing of same type.

2.05 TIMBER FRAMING

- A. Provide timber framing complying with the following requirements, according to grading rules of grading agency indicated:
 1. Species and Grade: See General Structural Notes.
 2. Maximum Moisture Content: See General Structural Notes.
 3. Additional Restriction: Free of heart centers.

2.06 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Blocking.
 2. Nailers.
 3. Cants.
 4. Furring.
- B. For items of dimension lumber size, provide lumber of same species and grade as load-bearing framing indicated above.
- C. For exposed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:
 1. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Premium or 2 Common (Sterling) grade; NeLMA, NLGA, WCLIB, or WWPA.
 2. Mixed southern pine, No. 1 grade; SPIB.
 3. Hem-fir or hem-fir (north), Select Merchantable or No. 1 Common grade; NLGA, WCLIB, or WWPA.
 4. Spruce-pine-fir (south) or spruce-pine-fir, Select Merchantable or No. 1 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- D. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
 1. Mixed southern pine, No. 2 grade; SPIB.
 2. Hem-fir or hem-fir (north), Construction or 2 Common grades; NLGA, WCLIB, or WWPA.
 3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or 2 Common grades; NeLMA, NLGA, WCLIB, or WWPA.
 4. Eastern softwoods, No. 2 Common grade; NeLMA.
 5. Northern species, No. 2 Common grade; NLGA.
 6. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

- E. For blocking not used for attachment of other construction, No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- F. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- G. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.07 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than **3/4-inch** nominal thickness.

2.08 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with post-hot-dip galvanized zinc coating complying with ASTM A 153, or mechanically galvanized complying with ASTM B695, Class 55 or greater.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Use only expansion bolts listed in General Structural Notes.

2.09 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements listed in General Structural Notes.
- B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 (Z180) coating designation.
 - 1. Use for interior locations only.
 - 2. See General Structural Notes for requirements when used in exterior applications or with preservative-treated lumber.
- C. Stainless-Steel Sheet: ASTM A 666, Type 316L.
 - 1. Use for exterior locations and only where specifically indicated in the drawings. See General Structural Notes for other requirements.

- D. Joist Hangers, Holdowns, Hurricane Clips, and other miscellaneous light gage connectors: Refer to Structural Drawings.

2.10 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
 - 1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- E. Do not splice structural members between supports, unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not

- inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal- thickness.
3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- H. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
1. Use inorganic boron for items that are continuously protected from liquid water.
 2. Use copper naphthenate for items not continuously protected from liquid water.
- J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. NES NER-272 for power-driven fasteners.
 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- K. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.
- L. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
1. Comply with indicated fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
 2. Use finishing nails, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
- 3.02 WOOD BLOCKING, AND NAILER INSTALLATION
- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.03 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-4-inch nominal size furring horizontally and vertically at 16 inches o.c.
- C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size furring vertically at 16 inches o.c.

3.04 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate (unless double bottom plates are shown on the drawings) and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction, unless otherwise indicated.
 - 1. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.
- C. Frame openings in accordance with following requirements:
 - 1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.
 - 2. For load-bearing walls, see Structural Drawings.

3.05 CEILING JOIST AND RAFTER FRAMING INSTALLATION

- A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
 - 1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal-size or 2-by-4-inch nominal-size stringers spaced 48 inches o.c. crosswise over main ceiling joists.
- B. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
 - 1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
 - 2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.

- C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal-size boards between every third pair of rafters, but not more than 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
- D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions, if any.

3.06 TIMBER FRAMING INSTALLATION

- A. Install timber with crown edge up and provide not less than 4 inches of bearing on supports. Provide continuous members, unless otherwise indicated; tie together over supports as indicated if not continuous.
- B. Where beams or girders are framed into pockets of exterior concrete or masonry walls, provide 1/2-inch air space at sides and ends of wood members.
- C. Install wood posts using metal anchors indicated.
- D. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

3.07 STAIR FRAMING INSTALLATION

- A. Provide stair framing members of size, space, and configuration indicated or, if not indicated, to comply with the following requirements:
 - 1. Stringer Size: 2-by-12-inch nominal-size, minimum.
 - 2. Stringer Material: Engineered Lumber or Sawn Lumber.
 - 3. Notching: Notch stringers to receive treads, risers, and supports; leave at least 3-1/2 inches of effective depth.
 - 4. Stringer Spacing: At least 3 stringers for each 36-inch clear width of stair.
- B. Provide stair framing with no more than 3/16-inch variation between adjacent treads and risers and no more than 3/8-inch variation between largest and smallest treads and risers within each flight.

3.08 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Concealed building insulation.
 - a. Blanket insulation.
 - b. Acoustical insulation.
 - c. Foam-plastic board insulation.
 - d. Spray Polyurethane Foam Insulation
- B. Related Sections:
 - 1. Division 07 Section “Joint Sealants” a non-rated joint system, and for sound attenuation related sealant.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product test reports.
- C. Research/Evaluation Reports: For foam-plastic insulation.
- D. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 for surface-burning characteristics and other methods indicated with product, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

PART 2 – PRODUCTS

2.01 BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide EcoTouch® PINK® Insulation, or approved equal products by one of the following:
 - 1. Roxul
 - 2. Fibrex Insulations Inc.
 - 3. Thermafiber.
- B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 0 and 0, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
- C. Insulation shall have a minimum of 50% total recycled content. Required to be GREENGUARD Gold Certified and Formaldehyde free.
- D. Size: Maximum thickness to fill wall cavity.

2.02 ACOUSTICAL INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide Dow Corning Quiet Zone Noise Control Solutions acoustical insulation, or approved equal products by one of the following:
 - 1. Roxul
 - 2. Fibrex Insulations Inc.
- B. Unfaced, Acoustical Insulation: ASTM C 665; with maximum flame-spread and smoke-developed indexes of 0 and 0, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics; and having NRC 1.05 per ASTM C423 for acoustical performance.
- C. Insulation shall have a minimum of 50% total recycled content. Required to be GREENGUARD Gold Certified and Formaldehyde free.
- D. Size: Maximum thickness to fill wall cavity.

2.03 SPRAY POLYURETHANE FOAM INSULATION

- A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation.
 - b. Dow Chemical Company (The).
 - c. Henry Company.
 - d. Convenience Products; Touch 'n Seal® Foam Kit, 1.75 pcf FR ICC
 - 2. Minimum density of 1.5 lb/cu. ft., thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F.

2.04 AUXILIARY INSULATING MATERIALS

- A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

2.05 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate formed from perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square, welded to projecting copper-coated steel spindle 0.105 inch in diameter and of length capable of holding insulation of thickness indicated securely in position with 1-1/2-inch- square or diameter self-locking washers complying with the following requirements:
 - 1. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch thick galvanized steel sheet, with beveled edge for increased stiffness.
- B. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

2.06 ACOUSTICAL SEALANT

- A. See Section 07 92 00 Joint Sealants.

PART 3 – EXECUTION

3.01 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.02 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 5. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation. For exterior Ceiling/Roof Insulation: Set units with facing placed toward interior of construction.
 - 6. Un-Faced Blankets: Apply vapor retarder, as specified below, after installation of blankets at framing members.
- D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.
- E. Seal overlapping seams in vapor retarder with vapor retarder manufacturer's tape.

- F. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.
- G. Caulk perimeter joints of door and window frames to ensure complete seal with the vapor retarder.
- H. For acoustical walls, seal both sides of all joints, top and bottom plates, frames, penetrations, electrical boxes, and similar items with acoustical caulk.
- I. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.
- J. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.

3.05 INSTALLATION OF UNDER-SLAB INSULATION

- A. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
- B. Protect top surface of horizontal insulation from damage during concrete work by applying protection course with joints butted.

3.06 INSULATION SCHEDULE

- A. Exterior Walls: Unfaced blanket insulation.
- B. Interior Walls: Unfaced, Sound-Rated acoustical insulation

END OF SECTION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Division 01 Specification Sections, apply to this Section

1.02 SUMMARY

- A. Section Includes:
 - 1. Manufactured products
 - a. Manufactured reglets with counterflashing.
 - 2. Formed products.
 - a. Formed wall sheet metal fabrications.
 - b. Formed equipment support flashings
- B. Related Sections
 - 1. All sections in Division 07

1.02 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference:
 - 1. Meet with Owner, Architect, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, and roof-mounted equipment.
 - 2. Review methods and procedures related to sheet metal flashing and trim.
 - 3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 - 4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.
 - 5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.03 SUBMITTALS

- A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Identification of material, thickness, weight, and finish for each item and location in Project.
 - 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 - 3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 - 4. Details of termination points and assemblies, including fixed points.
 - 5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
 - 6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counter-flashings as applicable.

7. Details of special conditions.
 8. Details of connections to adjoining work.
 9. Detail formed flashing and trim at a scale of not less than 3 inches per 12 inches.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
 3. Accessories and Miscellaneous Materials: Full-size Sample
- D. Product certificates.
- E. Product test reports.
- F. Sample warranty.
- G. Maintenance data.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
1. For copings and roof edge flashings that are SPRI ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.

1.07 WARRANTY

- A. Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - b. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 – PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Fabricate and install roof edge flashing and copings capable of resisting the following forces

according to recommendations in FMG Loss Prevention Data Sheet 1-49:

1. Wind Zone 2: For velocity pressures of 31 to 45 lbf/sq. ft: 90-lbf/sq. ft. perimeter uplift force, 120-lbf/sq. ft. corner uplift force, and 45-lbf/sq. ft. outward force.
- D. Recycled Content of Steel-Sheet Flashing and Trim: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.02 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; 4 (polished directional satin) finish.
- C. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.
 2. Surface: Smooth, flat.
 3. Color: Match Architect's samples
 4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
- D. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- E. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- F. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant.
- G. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- H. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- I. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- J. Seams - Flashing: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- K. Do not use graphite pencils to mark metal surfaces

2.03 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation

and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2-inch wide and 1/8 inch thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.
- I. Sill Pans
 - 1. 22ga. Sheet Metal Flashings shaped as shown on drawings
- J. Flashings
 - 1. 24ga. Sheet Metal Head Flashings w/ End Dams
 - 2. 22ga. Sheet Metal Cap Flashings w/ Standing Seams
 - 3. 24ga. Sheet Metal Through Wall Flashing w/ 4" Bayonet Seams and End Dams

2.04 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate cross section dimensions as shown on drawings, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in maximum section lengths possible, with expansion joints placed as recommended by SMACNA'. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness.
- B. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters.
 - 1. Fabricate from the following materials:
 - a. Aluminum-Zinc Alloy-Coated Steel: 22 gauge thick.
 - 2. Accessories: Cast aluminum dome strainers.
- C. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated complete with outlet tubes, exterior flange trim, and built-in

overflows. Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick

D. Cast Aluminum Dome Strainers:

1. At downspout attachments, provide dome cast aluminum dome strainers, sized and profiled to suit gutter and downspouts with scissor expansion anchor that fits into downspout. Wire screen dome strainers are not acceptable.

2.05 EXTERIOR ENVELOPE FLASHINGS

- A. 24ga. Sheet Metal Head Flashings w/ End Dams
- B. 22ga. Sheet Metal Cap Flashings w/ Standing Seams
- C. 24ga. Sheet Metal Through Wall Flashing w/ 4" Bayonet Seams and End Dams
- D. Note: Through Wall Flashings are required at floor level in floors exceeding two stories.

2.06 MANUFACTURED REGLETS

- A. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
 - a. Fry Reglet Corporation.
 - b. Hickman Company, W. P.
 2. Material: Stainless steel, 0.019-inch-thick, Galvanized steel, 0.022 inch thick.
 3. Finish: Mill.

2.07 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 1. Obtain field measurements for accurate fit before shop fabrication.
 2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- C. Sealant Joints: Where movable, non-expansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

- F. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

2.06 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
 - 1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
 - 2. Sheet-metal products that are installed integrally with PVC roofing systems, are specified in Section 07 5419- Polyvinyl-Chloride (PVC) Roofing.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 - 5. Install sealant tape where indicated.
 - 6. Torch cutting of sheet metal flashing and trim is not permitted.
 - 7. Do not use graphite pencils to mark material surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 - 1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or

- 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection per SMACNA recommendations.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."
 - 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 - 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- G. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.03 ROOF-DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters: Join sections with lapped joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter brackets spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
 - 1. Fasten gutter spacers to front and back of gutter.
 - 2. Loosely lock straps to front gutter bead and anchor to roof deck.
 - 3. Anchor and loosely lock back edge of gutter to continuous cleat.
- C. Downspouts: Join sections of existing downspouts to gutters with PVC primer and pipe adhesive.
- D. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches in direction of water flow.

3.04 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in

- FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at 16-inch centers.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
 - 1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 16-inch centers.
 - 2. Anchor interior leg of coping with screw fasteners and washers at 20-inch centers.
 - D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
 - E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.
 - F. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of anchor and washer at 36-inch centers.
 - G. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.05 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.06 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in SMACNA.

3.07 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturers written installation instructions.

END OF SECTION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Sealants.
 - 2. Primers.
 - 3. Back-up Materials.
- B. Related Sections:
 - 1. 07 6200 - Sheet Metal Flashing and Trim.
 - 2. 08 8000 - Glazing.

1.03. REFERENCES

- A. ASTM C 920 Specification for Elastomeric Joint Sealants
- B. ASTM C 1193 Standard Guide for Use of Sealant Joints

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01 3300.
 - 1. Product Literature for each material used.
 - 2. Manufacturer's surface preparation and installation instructions.
 - 3. Samples:
 - a. Submit cured samples of each sealant type and color proposed for the work.
 - b. For each sealant type indicated for "color as selected," or for which no color is indicated, submit color card indicating available stock colors from manufacturer's complete line for each type of sealant.
 - c. For custom colors, request color selection from the Architect prior to sample submittal.
 - 4. Schedule of sealant colors and respective locations.
 - 5. Letter from the sealant manufacturer stating that the exterior silicone sealant has been tested for compatibility with adjacent materials and is acceptable for use in the Project. The letter should address any compatibility issues including but not limited to adhesion and staining of adjacent materials. Samples of adjacent materials should be provided to the sealant manufacturer as necessary to confirm compatibility.

1.05 WARRANTY

- A. Materials and installation shall be warranted for a period of not less than 5 years.
- B. Warrant that sealants used in contact with laminated and/or sealed insulating glass units will not damage lamination or sealants used in double glazed units.

PART 2 – PRODUCTS

2.01 SEALANTS

- A. Sanitary Sealant:
1. Sanitary Sealant: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - a. Dow 8640 - Dow Corning Corp, Midland, MI, (517) 496-4000.
 - b. GE 1702 - General Electric Co/Silicone Products Div, Waterford, NY, (518) 237-3330.
 - c. Omni-Plus by Sonneborn, Shakopee MN, (612)496-6000.
 - d. Substitutions: Under provisions of Section 01 6000.
 2. Mildew resistant, one-part, silicone rubber.
 - a. Colors: Match sealant material to colors of adjacent materials from manufacturer's standard colors, as approved by Architect.
- B. Interior Sealant:
1. Interior Sealant: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - a. "Chem-Calk 600" - Bostik Construction Products, Huntington Valley, PA (800) 523-6530.
 - b. "AC-20" - Pecora Corporation, Harleysville, PA, (215) 723-6051.
 - c. "Acrylic Latex" - Tremco, Cleveland, OH, (216) 292-5000.
 - d. Substitutions: Under provisions of Section 01 6000.
 2. One-part, non-sag, acrylic latex meeting the requirements of ASTM C834 with 10-year life expectancy.
 3. Colors: Match sealant material to colors of adjacent materials from manufacturer's standard colors, as approved by Architect.
- C. Exterior Joints
1. Exterior Non-Traffic Bearing Sealants - Low Modulus, Neutral Cure Silicone:
 - a. Dow Chemical Co. "Dow Corning 790 or 795."
 - b. Sonneborn Building Products Div., ChemRex, Inc. "Sonolastic Omniseal."
 - c. Substitutions: Under provisions of Section 01 6000.
 2. ASTM Specification C 920 Type S, Grade NS, Class 25, Use NT, M, G, A and O.
 3. Colors: Match sealant material to colors of adjacent materials from manufacturer's standard colors, as approved by Architect.
 4. Sand: ASTM C144; clean, dry mason's sand; color similar to sealant color as approved by Architect for use in brick, stone and concrete walls.

2.02 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant at Acoustical wall finish elements: Manufacturer's standard nonsag, paintable, non-staining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Pecora Corporation; AC-20 FTR for fire rated assemblies, AIS-919 for non-fire-rated assemblies.
 - b. USG Corporation; SHEETROCK Acoustical Sealant.
 - c. Or approved equal.
- B. Acoustical Joint Sealant at Acoustical wall framing members; between structure and top and bottom plates, framing to door and window frames: Non-hardening, permanently resilient, butyl rubber-base compound caulking. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Pecora Corporation; BA-98.
 - b. Or approved equal.

2.03 COMPRESSIBLE FOAM TAPE

- A. Back-Up Seal: Pre-compressed self-adhesive open cell polyurethane foam tape, grey or black color; Emseal Joint Systems, Ltd.; Manville Roofing Systems Division "Greyflex," Will Seal Construction Foams, a division of Illbruck "Will-Seal 150," or approved.
- B. Exposed Foam Tape Seal: Emseal "ColorSeal" with Dow 790 Silicone Sealant pre-applied to the surface; color as selected by Architect.
- C. Furnish tape in thickness recommended by the manufacturer for widths of joints to be filled.

2.04 PRIMERS

- A. Primers as required and recommended by sealant manufacturer.
- B. Provide cleaner conditioner required for glass and glazed surfaces as recommended by sealant manufacturer.

2.05 BACK-UP MATERIALS

- A. Bond Breaker Tape: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. "470 or 481 polyethylene" - 3M Adhesives, Coatings and Sealers Div, St. Paul, MN, (612) 733-1140.
 - 2. Substitutions: None accepted.
- B. Joint Backer Rod:
 - 1. Joint Backer Rod: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - a. "Ethafoam" - Dow Chemical USA, Midland, MI, (800) 258-2436.
 - b. Substitutions: None accepted.
 - 2. Closed cell polyethylene size to produce 25 percent minimum compression when installed in joint.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Surfaces to be sealed shall be clean, dry and dust free. Surface and air temperature shall be greater than 30^o F. and less than 100^o F. Remove paint, including lacquer, from aluminum.
- B. Mask surfaces or panels to prevent sealant from adhering to surfaces not required to receive sealant

3.02 INSTALLATION

- A. General:
 - 1. All exterior and interior joints required to be sealed for movement, airtightness, watertightness, weathertightness and/or appearance.
 - 2. Exterior locations include, but not limited to:
 - a. Expansion joints.
 - b. Door and window frames and adjacent construction.
 - c. Under thresholds.
 - d. Construction joints.
 - e. Refrigerant lines entering building.
 - e. Wall and soffit joints.

- f. Metal to concrete.
- g. Metal to wood.
- h. Masonry and stone to concrete.
- i. Junction between vertical and horizontal surfaces.
- j. Joints in exposed roof flashing and coping caps, except standing seam type.
3. Interior locations include, but not limited to:
 - a. Door and window frames and adjacent construction.
 - b. Under thresholds.
 - c. Construction joints.
 - d. Door bucks not flush with thresholds.
 - e. Unintentional voids between gypsum board and other materials.
4. Sanitary:
 - a. Lavatory tops and water closets.
 - b. Around countertops and top of back and side splashes.
 - c. Joints at mirrors located in wet areas.
5. See other Sections for sealing to be performed as part of the work of that Section and not specified herein.

B. Primer:

1. Ensure that primer fully covers surfaces to which sealant is to adhere.
2. Apply with bristle brush. Do not flood surfaces.
3. Prevent primer from contacting faces of panels, back of joint or backer rod.
4. Allow primer to cure according to manufacturer's recommendations prior to application of backing rod and sealant.

C. Backing Materials:

1. Install rod with blunt probe or plain faced roller, using a template or roller gauge to control the depth rod is placed.
2. Install in continuous lengths as long as practical.
3. Do not puncture, fold or crease backer rod. Replace punctured backing rod.
4. Backing rods shall have compression fit.
5. Joint Size:
 - a. Depth of joint shall not exceed width of joint.
 - b. Joint width to sealant depth: approximately 2:1 (where appropriate)
 - b. Minimum depth: 1/4".
 - c. Maximum depth: 1/2".
6. Install bond breaking tape in shallow joints. Completely cover back surface. Do not diminish area of edge adhesion of sealant.

D. Sealant:

1. Install in accordance with manufacturer's written instructions and the requirements of ASTM C1193.
2. Apply sealant with continuous pressure ahead of sealant gun. Size gun nozzle to fit joint, completely filling joint. Superficial pointing with skin bead is not acceptable.
3. At vertical joints, gun sealant from the bottom of joint upward.
4. Tool sealant within 10 minutes after installation to produce proper joint profile, fill voids and ensure full contact with sides of joints.
5. Tool lightly with minimum pressure using soapy water to prevent adhesion to tools. In no case shall sealants be wet tooled.

3.03 COMPRESSIBLE FOAM TAPE INSTALLATION

- A. Install in accordance with manufacturer's recommendations.
- B. Install sufficiently deep to accommodate the installation of the exterior silicone sealant.

3.04 CLEANING

- A. Remove masking material immediately following sealant application.
- B. Clean adjoining surfaces to eliminate evidence of overflow, spillage or migration of sealant.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes specifications for:
 - 1. Non-fire-rated steel doors and frames
 - 2. Fire-rated steel doors and frames
 - 3. Accessories, including glazing and matching panels

- B. Related Sections Include:
 - 1. 08 71 11 - Door Hardware
 - 2. 08 80 00 – Glazing
 - 3. 09 29 00 – Gypsum Board Assemblies
 - 4. 09 91 23 – Painting

1.02 REFERENCES

- A. This Section incorporates by reference the latest revision of the following documents.
 - 1. American National Standards Institute (ANSI), International Code Council (ICC)
 - a. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council
 - b. ANSI A250.8 - SDI-100 Specifications for Standard Steel Doors and Frames
 - c. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames
 - 2. American Society for Testing and Materials International (ASTM)
 - a. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
 - 3. Door and Hardware Institute (DHI)
 - a. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute (ANSI/DHI A115 Series)
 - 4. The National Association of Architectural Metal Manufacturers (NAAMM)
 - a. NAAMM HMMA 840 - Guide Specification for Installation and Storage of Hollow Metal Doors and Frames
 - 5. National Fire Protection Association (NFPA)
 - a. NFPA 80 - Standard for Fire Doors and Other Opening Protectives
 - 6. Underwriters Laboratories Inc. (UL)
 - a. UL 10C – Standard for Positive Pressure Fire Tests of Door Assemblies
 - b. UL 1784 - Standard for Air Leakage Tests of Door Assemblies and Other Opening Protectives

1.03 SUBMITTALS

- A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.

- B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any. Include installation details for each condition.

- C. Transmit: Installation Instructions: Manufacturer's published instructions, including all special installation instructions relating to this project.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum 3 years documented experience.
- B. Single Source: Obtain hollow metal doors and frames from a single manufacturer.
- C. Maintain at the project site a copy of all reference standards dealing with installation.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store in accordance with NAAMM HMMA 840.
- B. Clearly identify and mark each door and frame to correspond with same number as listed on the schedule submitted with shop drawings.
- C. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.
- D. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work. Remove and replace damaged items as directed by Resident Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Doors and Frames
 - 1. Requirements for All Doors and Frames:
 - a. Accessibility: Comply with ANSI/ICC A117.1
 - b. Door Top Closures: Flush with top of faces and edges
 - c. Door Edge Profile: Beveled on both edges
 - d. Door Texture: Smooth faces
 - e. Infill panels: Non-removable stops on non-secure side. Hardware Preparation: In accordance with DHI A115 Series, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
 - f. Finish: (Note- choose final finish based on location) Galvanized, unless noted otherwise in door schedule: All components hot-dip zinc-iron alloy-coated (galvannealed), ASTM A653, A40 coating thickness or baked –on primed paint, for field finishing.
 - 2. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated shall comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.
 - 3. Doors and Frames: Label in accordance with code requirements.
- B. Steel Doors
 - 1. Exterior Doors:
 - a. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless

- b. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.
 2. Thermal-Rated (Insulated) Doors: For exterior doors enclosing conditioned space provide doors fabricated with thermal-resistance value (R-value) to meet energy code requirements when tested according to ASTM C 1363.
 3. Interior Doors, Non-Fire-Rated:
 - a. Grade: ANSI A250.8 Level 1, physical performance Level C, Model 1, full flush
 4. Interior Doors, Fire-Rated:
 - a. Grade: ANSI A250.8 Level 2, physical performance Level B, Model 1, full flush
 - b. Fire Rating: As indicated on Door and Frame Schedule, complying with NFPA 80 and tested in accordance with UL 10C ("positive pressure").
 - 1) Provide units listed and labeled by UL
 - 2) Attach fire rating label to each fire rated unit
 - c. Smoke and Draft Control Doors (Pressure Resistant Doors) (Indicated as "S" in Door Schedule): In addition to required fire rating, provide door assemblies tested in accordance with UL 1784 with maximum air leakage of 3.0 cubic feet per minute per square foot of door opening at 0.10-inch water gage pressure at both ambient and elevated temperatures; with "S" label; if necessary, provide additional gasketing or edge sealing.
 - 1) Grade: ANSI A250.8 Level 3, physical performance Level A, Model 1, full flush
 - 2) Door hardware to conform to door assembly design pressure loads.
 5. Panels: Same construction, performance, and finish as doors.
- C. Steel Frames
1. General:
 - a. Comply with the requirements of grade specified for corresponding door.
 - 1) ANSI A250.8 Level 3 Doors: Minimum 14 gage frames (typical, unless noted or specified otherwise).
 - b. Finish: Same as for door where doors are not factory-finished.
 - c. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry.
 - d. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
 2. Interior Door Frames, Non-Fire-Rated: Fully welded type
 - a. Finish: Factory primed, for field finishing
 3. Interior Door Frames, Fire-Rated: Fully welded type
 - a. Fire Rating: Same as door, labeled

2.02 FRAME ANCHORS

- A. Jamb Anchors:
1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
 2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
 3. Post-Installed Expansion Anchor: Minimum 3/8-inch diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

- C. Retain "Floor Anchors for Concrete Slabs with Underlayment" Paragraph below when using flowable underlayment over slabs or floor structure.
- D. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.
- E. Material: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
- F. For anchors built into exterior walls, steel sheet complying with ASTM A 1008 or ASTM A 1011; hot-dip galvanized according to ASTM A 153, Class B.

2.03 ACCESSORY MATERIALS

- A. Silencers: Resilient rubber, fitted into drilled hole; three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- B. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames
- C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153
- D. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- E. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

2.04 FABRICATION

- A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- B. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with mitered hairline joints.
- C. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
- D. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
- E. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
- F. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

2.05 FINISH MATERIALS

- A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard and compatible with substrate and field-applied coatings despite prolonged exposure.

1. Siliconized primers are not permitted.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.

3.02 PREPARATION

- A. Coat inside of frames with bituminous coating, prior to installation.
- B. Coat inside of frames with bituminous coating to a thickness of 1/16 inch.

3.03 INSTALLATION

- A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
- B. In addition, install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Install louvers where shown, with tamper proof screws
- E. Install perforated metal infill panels into opening with non-removable stops on non-secure side of door.
- F. Grouting Door Frames: Do not grout frames except the frames installed on CMU walls
- G. Coordinate installation of hardware.
- H. Coordinate installation of electrical connections to electrical hardware items.
- I. Field Touch-Up Painting: Touch-up doors and frames including the refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and or marred surfaces

3.04 CONSTRUCTION

- A. Erection Tolerances
 1. Clearances between Door and Frame: As specified in ANSI A250.8.
 2. Maximum Diagonal Distortion: 1/16-inch measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.06 SCHEDULES

- A. Refer to Door and Frame Schedule on the Contract Drawings.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Solid-core doors with wood-veneer faces.
 - 2. Factory finishing flush wood doors.
 - 3. Factory fitting flush wood doors to frames and factory machining for hardware.
- B. Related Sections Include:
 - 1. 06 10 00 - Rough Carpentry
 - 2. 08 11 13 - Hollow Metal Doors and Frames
 - 3. 08 71 11 - Door Hardware
 - 4. 08 80 00 - Glazing

1.03 REFERENCES

- A. AWI Section 1300 – Architectural Flush Doors.
- B. UL 10C – Positive Pressure Fire Tests of Door Assemblies.
- C. WDMA Finish System TR-6, transparent – Catalyzed Polyurethane.
- D. WDMA I.S.1-A – Architectural Wood Flush Doors.

1.04 SUBMITTALS

- A. Product Data: For each type of door indicated. Include details of core and edge construction, and trim for openings. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
 - 1. Indicate dimensions and locations of mortises and holes for hardware.
 - 2. Indicate dimensions and locations of cutouts.
 - 3. Indicate requirements for veneer matching.
 - 4. Indicate doors to be factory finished and finish requirements.
 - 5. Indicate fire-protection ratings for fire-rated doors.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors from single manufacturer.
- B. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated."

1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.

- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252.

1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.

1.08 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers – Basis of Design: Eggers Door Co. with “AgFiber Core”; subject to compliance with requirements, or with Architect approval, provide products of one of the following:
 1. Algoma Hardwoods, Inc.
 2. Marshfield Door Systems, Inc.
 3. Mohawk Flush Doors, Inc.; a Masonite company.
 4. VT Industries Inc.

2.02 DOOR CONSTRUCTION, GENERAL

- A. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
- B. Particleboard-Core Doors:
 1. Particleboard: Straw-based particleboard complying with ANSI A208.1, Grade LD-2 or

M-2, except for density.

2. Provide doors with structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.
 - a. Structural-Composite-Lumber-Core Doors:
 - 1) Structural Composite Lumber: WDMA I.S.10.
 - a) Screw Withdrawal, Face: 700 lbf.
 - b) Screw Withdrawal, Edge: 400 lbf.

2.03 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
 1. Grade: Premium, with Grade AA faces.
 2. Species: Quartersawn, White Maple face veneers book match at veneer joints, factory finished to match Architect's approved sample. Provide exposed edges and other exposed solid wood components of the same species
 3. Assembly of spliced veneers: Center balance match.
 4. Doors in Pairs and Sets.
 - a. Pair Match required at pairs
 - b. Set Match required at sets (Sets to be Matched, must be determined by Door number in Door Schedule)
 - c. Doors located within six inches of each other shall be pair matched.
 - d. Door schedule shall reflect pairs and sets by door numbers to be matched, including doors separated by a mullion.
 5. Core: "AgFiber" core, or approved Equal.
 6. Construction: F i v e o r Seven plies, bonded construction.

2.04 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 1. Comply with requirements in NFPA 80 for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Openings: Cut and trim openings through doors in factory.
 1. Light Openings: Trim openings with wood moldings of white oak material and profile indicated.
 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."

2.05 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Finish all doors at factory.

- C. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: AWI catalyzed polyurethane system.
 - 3. Staining: Provide several stain samples applied on specified wood species for architect to match as closely as possible to the existing wood doors.
 - 4. Effect: Semi-filled finish, produced by applying an additional finish coat to partially fill the wood pores.
 - 5. Sheen: Satin.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
 - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
 - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
 - 3. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.03 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Exterior storefront framing and doors.
2. Related aluminum break shapes, and flashing,

B. Related Sections:

1. Division 07 Section "Sheet Metal Flashing and Trim."
2. Division 07 Section "Joint Sealants" for sealants applied during installation of work of this Section.
3. Division 08 Section "Door Hardware" for hardware not specified in this section.
4. Division 08 Section "Glazing" for glass and glazing scheduled for installation in aluminum storefronts and entrances.

1.03 PERFORMANCE REQUIREMENTS

- A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
2. Dimensional tolerances of building frame and other adjacent construction.
3. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferring to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
 - d. Noise or vibration created by wind and by thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Failure of operating units.

- B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

- C. Wind Loads: As indicated on Structural Drawings, "General Structural Notes."

D. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches, and to 1/240 of clear span plus 1/4 inch, for spans greater than 13 feet 6 inches when subjected to design wind loads indicated on structural drawings.
2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below them to less than 1/8 inch and clearance between members and operable units directly below them to less than 1/16 inch.

- E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
 - 1. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceed 0.2 percent of span.
 - 2. Test Durations: 10 seconds.
- F. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.
- G. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
- H. Thermal Performance - Exterior Storefront and Entrance Systems, and Windows:
 - 1. Thermal performance of exterior storefront and entrance systems and windows shall meet the requirements of Washington State Energy Code.
 - 2. Glazing system shall have been tested by the manufacturer in accordance with NFRC Standard 100-91 and certified in accordance with 2015 Washington State Energy Code, as capable of achieving a U factor of 0.38, maximum, for vision areas, including frames, vents, and glazing and 0.60 maximum for entrance doors. Test shall have been performed with glazing equivalent to that specified for vision glass in Division 08 Section "Glazing."

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated, including manufacturer's certification of compliance the thermal performance requirements.
- B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
- C. Samples: For each type of exposed finish required.
- D. Other Action Submittals:
 - 1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams.
- E. Delegated-Design Submittal: For aluminum-framed systems at long-span window openings, indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- F. Product test reports.
- G. Field quality-control reports.
- H. Maintenance data.
- I. Warranties: Sample of special warranties.

1.05 QUALITY ASSURANCE

- A. Manufacturer: Provide storefronts, door and vent products from a single manufacturer.
- B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- C. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
- D. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
- E. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
- F. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.
- G. Preinstallation Conference: Conduct conference at Project site.

1.06 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration caused by thermal movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Adhesive or cohesive sealant failures.
 - e. Water leakage through fixed glazing and framing areas.
 - f. Failure of operating components.
 - 2. Warranty Period: Five (5) years from date of Final Acceptance.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Product - Basis-of-Design: Subject to compliance with requirements, provide EFCO Corporation:
 - 1. Aluminum Storefront System: "System 403 – Thermal Flush-Glazed Screw Spline" 2" x 4-1/2"; thermally-improved, center-glazed, screw spline framing assembly, pre-finished aluminum storefront framing, or Architect approved comparable product by one of the following:
 - a. Kawneer North America; an Alcoa company.
 - b. United States Aluminum.

2. Aluminum Vents inside the above storefront frame system: "System MV430 – Thermally broken frames, pre-finished aluminum, with standard 4 bar hinge operation with cam lock. Provide a limiter at hardware to limit opening of vent to no more than 3-7/8".

2.02 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 1. Sheet and Plate: ASTM B 209.
 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 4. Structural Profiles: ASTM B 308/B 308M.
 5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
- B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.03 FRAMING SYSTEMS

- A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 1. Construction: Thermally improved; screw spline assembly.
 2. Glazing System: Retained mechanically with gaskets on four sides.
 3. Glazing Plane: Center-glazed.
 4. Head Receptors: Aluminum receptors.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 2. Reinforce members as required to receive fastener threads.
 3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.
- E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- F. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.
- G. Provide operable glazed units as indicated on drawings.

2.04 GLAZING SYSTEMS

- A. Glazing: As specified in Division 08 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

2.05 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's heavy-duty glazed entrance doors for manual-swing operation.
 - 1. Manufacturers/Models: EFCO "D502 Heavy-Duty Wide Stile Doors," or approved Equal heavy-duty, wide stile entrance doors, or comparable product meeting the specification requirements and subject to Architect approval, as manufactured by one of the following:
 - a. Kawneer North America; an Alcoa company.
 - b. United States Aluminum.
 - 2. Door Construction: 2-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
 - a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
 - 3. Door Design: Wide stile; 5-inch width.
 - a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.
 - 4. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide nonremovable glazing stops on outside of door.
 - b. Glazing stop sections shall have minimum .050" wall thickness.
- B. Door Frame:
 - a. Depth of frame shall not be less than 4 1/2" (114 mm) – EFCO System 403.
 - b. Face dimension shall not be less than 2" (50 mm) – EFCO System 403.
 - c. Shear block construction shall be utilized throughout.
 - d. System design shall be such that raw edges will not be visible at joints.

2.06 ENTRANCE DOOR HARDWARE

- A. General: Provide door hardware not indicated in Division 08 Section "Door Hardware" for each door to comply with requirements in this Section.
 - 1. Coordinate installation with work specified in Division 28.
- B. Strikes: Coordinate required strikes with items supplied in Division 08 Section "Door Hardware."
- C. Weather Stripping: Manufacturer's standard replaceable components.
- D. Silencers: BHMA A156.16, Grade 1.
- E. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.07 METAL WINDOW PANELS

- A. EFCO Metal Window Panels - 1-inch insulated 5 ply panel. .062-inch skin adhered to 0.157-inch cement board each side with 0.5625-inch polystyrene center.
- B. Paint custom color on each exposed skin (interior and exterior). Finish to be High performance 70% PVDF fluoropolymer Ultrapon™ (AAMA Guide Spec 2605-98).

2.08 ACCESSORY MATERIALS

- A. 0.062" thick break shape aluminum metal panels at various locations shown on the drawings. Prefinished to match storefront frame color.
- B. Mullion Cover, aluminum matching storefront frame: 2" wide x .75" deep. (EFCO part # 6203 and 7419)
- C. Aluminum snap caps to complete assembly as detailed on drawings.
- D. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

2.09 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 6. Provisions for field replacement of glazing from interior.
 - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
- F. Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
- H. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

1. Color: Clear Anodized

PART 3 – EXECUTION

3.01 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Division 08 Section "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.02 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections.

B. Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.

1. Water Penetration Resistance Field Testing:

- a. At Storefront framing areas, ASTM E 1105-08 Procedure A (Uniform) test will be used for a single cycle not less than 20 minutes in duration at a maximum of 8 psf.
- b. The initial test will be inclusive of both installation interface and window product. In the case of failure (defined in the standard), the representative sample will be

- expanded to three (3) specimens in order to obtain statistical confidence in remedial repairs if needed. In the case of failure, the responsible party will be held financially liable for the cost of retesting, and any related wall assembly or cladding deconstruction needed to obtain passing results.
- c. Window Vents within Storefront Assemblies: At least one (1) window of each operational type will be tested to 6.24 psf pressure in accordance with ASTM E 1105-08.
 - d. This test specification supersedes AAMA Voluntary Specification for Field Testing.
 - e. The test reports will be reviewed and approved by a registered Professional Building Envelope Engineer.
2. Air Leakage Testing - Storefront Aluminum Frames (window walls, stick/site built):
- a. Areas shall be tested in accordance with ASTM E 783 for air infiltration 1.5 times the rate specified for laboratory testing under the "Performance Requirements" article, but not more than .06 cfm/sq. ft in a fixed wall section is permissible. Testing will be under uniform static pressure difference of 6.24 psf.
 - b. Operable vents shall be blanked out and tested separately.
 - c. The storefront specimen size shall be one area 100 ft sq minimum, and include all joinery and components listed in AAMA 503-03.3.5.5.
 - d. Exterior swing entries are not included in this test specification.
- C. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- E. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.

END OF SECTION

HW SET: 01
 FOR USE ON DOOR(S):
 100a 100b

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	PIVOT SET	7226 SET		626	IVE
1	EA	INTERMEDIATE PIVOT	7226 INT		626	IVE
1	EA	EXIT DEVICE	ED5200 X K157 SNB		630	C-R
1	EA	CYLINDER	3070-178		626	C-R
1	EA	SFIC CORE	8000-59A1		626	C-R
1	EA	ELECTRIC STRIKE	6111 FSE		↗ 630	VON
1	EA	90 DEG OFFSET PULL	8190EZHD 12" O		630- 316	IVE
1	EA	OH STOP	100S		630	GLY
1	EA	AUTO OPERATOR	M-FORCE SWING DOOR OPERATOR		↗ 689	STA
2	EA	ACTUATOR	10PBS451		630	BEA
1	EA	DOOR SWEEP	8198AA		AA	ZER
1	EA	THRESHOLD	545A		A	ZER
1			CARD READER - WORK OF DIVISION 28			
1	EA		WEATHERSTRIP BY DOOR/FRAME MANUFACTURER			

VERIFY COMPATIBILITY WITH OVERHEAD STOP AND AUTOMATIC OPERATOR

DOOR NORMALLY CLOSED AND LOCKED. VALID CREDENTIAL WILL MOMENTARILY RELEASE ELECTRIC STRIKE AND ENABLE OUTSIDE ACTUATOR, DOOR CAN BE OPENED MANUALLY OR PUSHING THE ACTUATOR WILL AUTOMATICALLY OPEN DOOR. INTERIOR ACTUATOR ALWAYS ACTIVE. AUTOMATIC OPERATOR WILL DISABLE AND DOOR WILL REMAIN LOCKED UPON LOSS OF POWER. FREE EGRESS AT ALL TIMES.

HW SET: 02
 FOR USE ON DOOR(S):
 150a

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA HINGE	5BB1HW 4.5 X 4.5	626	IVE
1	EA MORTISE LOCK	ML2057 ESA ASA M17	626	
1	EA CYLINDER	1070-114-A02 VERIFY CAM	626	C-R
1	EA SFIC CORE	8000-59A1	626	C-R
1	EA ELECTRIC STRIKE	6211 FSE	630	VON
1	EA OH STOP	100S	630	GLY
1	EA CLOSER	DC2210 689 SNB		ASA
1	EA KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA GASKETING	488SBK PSA	BK	ZER
1	EA GASKETING	50AA-S	AA	ZER
1	EA DOOR SWEEP	8192AA	AA	ZER
1	EA THRESHOLD	545A	A	ZER
1		CARD READER - WORK OF DIVISION 28		
		POWER SUPPLY - WORK OF DIVISION 28		

HW SET: 03
 FOR USE ON DOOR(S):
 150b

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA HINGE	5BB1HW 4.5 X 4.5	626	IVE
1	EA MORTISE PASSAGE	ML2010 ESA M17 ASA	626	C-R
1	EA OH STOP	100S	630	GLY
1	EA CLOSER	DC2210 689 SNB		ASA
1	EA KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
3	EA SILENCER	SR64	GRY	IVE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Doors.
 - 2. Relites
- B. Related Sections include the following:
 - 1. 08 11 13 - Hollow Metal Doors and Frames, for doors and frames receiving glass and glazing.
 - 2. 08 14 16 – Flush Wood Doors
 - 3. 08 41 13 – Aluminum Storefront Systems.

1.03 DEFINITIONS

- A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.04 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service

conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - 1) Load Duration: 60 seconds or less.
 - b. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F, ambient; 160 deg F, material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
 1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
 2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 3. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
 - a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F.
 - b. Solar Heat Gain Coefficient: NFRC 200.
 - c. Solar Optical Properties: NFRC 300.

1.05 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: 12-inch square samples for glass.
- C. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
 1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.
- D. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.
- E. Product Test Reports

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass

Association's Certified Glass Installer Program.

- B. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.
- C. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:
 - 1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
 - 2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
 - 5. Testing will not be required if elastomeric glazing sealant manufacturers submit data based on previous testing of current sealant products for adhesion to, and compatibility with, glazing materials matching those submitted.
- D. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201:
 - 1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
 - 2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.
- E. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Coordination."

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1.09 WARRANTY

- A. Manufacturer's Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: 10 years from date of Substantial Completion.
- C. Manufacturer's Warranty on Spandrel Glass: Manufacturer's standard form, made out to Owner and signed by spandrel-glass manufacturer agreeing to replace spandrel-glass units that lose adhesion, flake, peel, chip or develop any noticeable color change, within specified warranty period indicated below.
1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 GLASS PRODUCTS

- A. Tempered Safety Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
 2. Provide Kind FT (fully tempered) float glass, 1/4" thick minimum.
- B. Laminated Safety Glass: ASTM C1172, standard laminated, two lights of clear glass with 0.060-inch vinyl interlayer; thicknesses and types as recommended by manufacturer for condition installed and per requirement called out in section 1.06 D above.
1. Install laminated safety glass at Relite Type R1 and Door Frame Type F7 shown on the drawing.
- C. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.
1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 2. Provide Kind FT (fully tempered) glass lites where safety or tempered glass is indicated.
 3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
 4. Sealing System: Dual seal, with primary and secondary sealants as follows:
 - a. Manufacturer's standard sealants.
 5. Spacer Specifications: Manufacturer's standard spacer material and construction

complying with the following requirements:

- a. Aluminum with powdered metal paint finish in color selected by Architect
 - b. Desiccant: Molecular sieve or silica gel, or blend of both.
 - c. Corner Construction: Manufacturer's standard corner construction.
- D. One-way Mirror Glass: for lite type F6 between Office 151 and Vestibule 100A.
1. Basis of design: 'Mirropane' by Pilkington.
 - a. Coating quality to meet ASTM C 1376.
 - b. Nominal Glass Thickness: 1/4".
 - c. Glass Substrate: Grey.
 - d. Visible Transmittance %: 11.
 - e. Visible Reflectance Coated Side %: 68.
 - f. Visible Reflectance Glass Side %: 16.
 - g. Recommended Light Ratio: 8:1 (Subject-side: Observer-side).
 - h. Proper glazing installation: Mirror coating toward subject-side (Vestibule 100A side).

2.02 INSULATING GLASS UNITS

- A. Solar-Control Low-E Insulating-Glass Units
1. Basis-of-Design Product: Guardian Sunguard SNX 62/27", or a comparable product by one of the following:
 - a. PPG
 - b. Viracon
 2. Overall Unit Thickness and Thickness of Each Lite: 1 inch and 6.0 mm.
 3. Outdoor Lite: Gray Tempered.
 4. Interspace Content: 90% Argon.
 5. Indoor Lite: Clear heat-strengthened float glass.
 6. Low-E Coating: Sputtered on second surface.
 7. Visible Light Transmittance: 31 percent
 8. Winter Nighttime U-Factor: 0.24 maximum.
 9. Summer Daytime U-Factor: 0.24 maximum.
 10. Solar Heat Gain Coefficient: 0.18 maximum.
 11. Light to Solar Gain (LSG): 1.69 minimum.
 12. Location: All exterior glazing

2.02 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Glazing Gaskets - Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
 1. Neoprene complying with ASTM C 864.
 2. EPDM complying with ASTM C 864.
 3. Silicone complying with ASTM C 1115.
 4. Thermoplastic polyolefin rubber complying with ASTM C 1115.
- D. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- E. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer

hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

- F. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.03 GLAZING SEALANTS

- A. General:
 - 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50; Use NT.

2.04 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; non-staining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.05 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep system.

3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.03 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches as follows:
1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner

joints and butt joints with sealant recommended by gasket manufacturer.

3.04 CLEANING AND PROTECTION

- A. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
- B. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- C. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes specifications for:
 - 1. Fire-rated wall assemblies.
 - 2. Gypsum wallboard.
 - 3. Cementitious backer board.
 - 4. Joint treatment and accessories.
 - 5. Acoustic insulation and sealant.
 - 6. Delegated design of framing systems.

1.02 REFERENCES

- A. This Section incorporates by reference the latest revisions of the following documents.
 - 1. American National Standards Institute (ANSI)
 - a. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile Setting Epoxy Adhesive
 - b. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout
 - c. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units
 - 2. American Society for Testing and Materials International (ASTM)
 - a. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - b. ASTM A568/A568M - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements
 - c. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - d. ASTM C475/C 475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
 - e. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members
 - f. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
 - g. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board
 - h. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2004
 - i. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
 - j. ASTM C1178/C1178M - Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel
 - k. ASTM C1396/C 1396M - Standard Specification for Gypsum Board
 - l. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
 - m. ASTM E72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction; 2005
 - n. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials
 - o. ASTM E488 - Standard Test Methods for Strength of Anchors in Concrete Elements

- p. ASTM E1190 - Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members
- 3. Gypsum Association (GA)
 - a. GA-214 – Recommended Levels of Gypsum Board Finish.
 - b. GA-216 - Application and Finishing of Gypsum Panel Products.
 - c. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association.
 - d. GA-600 - Fire Resistance Design Manual; Gypsum Association.
- 4. Underwriters Laboratories Inc. (UL)
 - a. UL (FRD) - Fire Resistance Directory.

1.03 SUBMITTALS

- A. Shop Drawings: Indicate special details associated with fireproofing, acoustic seals, and other unique details. Show size, gauge, and spacing of studs used to comply with specified requirements for steel framing, and show all control joints as indicated or required in accordance with ASTM C840.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- C. Engineering: for Delegated-Design Submittals include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Provide manufacturer's data or engineering calculations on spans, deflection, attachment methods, and bracing, and indicate compliance with code. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- E. Transmit: Test Reports: For all stud framing products that do not comply with ASTM C 645 or C 754, provide independent laboratory reports showing maximum stud heights at required spacing and deflections.

1.04 QUALITY ASSURANCE

- A. Single Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.
- B. Single Source Responsibility for Finishing Materials: Obtain finishing materials from the same manufacturer that supplies gypsum board and other panel products.
- C. Perform all work of this Section in accordance with ASTM C 840.
- D. Applicator Qualifications: Company specializing in performing gypsum board application and finishing, with minimum three years of documented experience.
- E. Coordination: Coordinate work with that of other trades, including but not limited to plumbing, HVAC, electrical and fire sprinklers, to ensure complete and proper installation of all trades. Include coordination with and provision for design-build trades in base bid pricing.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

- C. Handle gypsum board to prevent damage to edges, ends, and surfaces. Do not bend or otherwise damage metal corner beads and trim.

1.06 PROJECT CONDITIONS

- A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 and with gypsum board manufacturer's recommendations.
- B. Ventilation: Ventilate building spaces, to the extent required, for drying joint treatment materials. Avoid drafts during hot dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Gypsum Board:
 - 1. Georgia-Pacific Gypsum Corporation: www.gp.com/gypsum.
 - 2. National Gypsum Company: www.nationalgypsum.com.
 - 3. United States Gypsum Company: www.usg.com.
- B. Cementitious Backer Board
 - 1. Custom Building Products: www.custombuildingproducts.com
 - 2. James Hardie: www.jameshardie.com
 - 3. United States Gypsum Company: www.usg.com

2.02 PERFORMANCE CRITERIA

- A. Fire Test Response Characteristics: Where fire-rated gypsum board assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance in accordance with ASTM E 119 by an Independent Testing Laboratory agency acceptable to the authorities having jurisdiction.
- B. Fire Resistance Ratings: As indicated by reference to GA file numbers in GA-600 "Fire Resistance Design Manual" or to design designations in UL "Fire Resistance Directory" or in the listing of another Independent Testing Laboratory acceptable to authorities having jurisdiction.
 - 1. Regulatory Requirements
 - a. Conform to applicable code for fire-rated assemblies as follows:
 - b. Fire-Rated Partitions: Listed assembly by UL or GA with required hour ratings as indicated on Drawings.
 - c. Head of Fire-Rated Partitions: Listed assembly by UL or GA with required hour ratings as indicated on Drawings.

2.03 MATERIALS

- A. Gypsum Board
 - 1. Wallboard-Fire Rated: ASTM C36; 5/8-inch-thick, Type X and as detailed, maximum permissible length; end square cut, edges tapered unless indicated or required otherwise by conditions of installation. UL labeled and ICBO approved for fire-resistive system detailed. Use throughout project.
 - 2. GWB-2: Same as GWB-1 except fire rated. Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed. Water Resistant Board: ASTM C630; 5/8-inch Type WR and fire rated as detailed, maximum permissible length; end square cut, edges tapered

unless indicated or required otherwise. ICBO approved for installation in moisture areas including but not limited to locker rooms.

- B. Cementitious Backerboard Substrate for Ceramic Wall Tile and Interior Acoustical Cement Plastering.
 - 1. Backerboard: ANSI A118.9; High density, cementitious, glass fiber reinforced. 5/8" thick unless noted otherwise.
 - 2. Mesh Tape: 2-inch wide self-adhesive, coated fiberglass mesh tape for joints and corners.

2.04 ACCESSORIES

- A. Sound Attenuation Blankets: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C665 for Type I (blankets without membrane facing):
 - 1. Mineral-Fiber Type: Fibers manufactured from glass or slag.
- B. Acoustic Sealant: Non-hardening, non-skinning, non-sag, non-staining, paintable latex sealant, for use in conjunction with gypsum board, and complying with ASTM C834 and the following:
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. AC-20 FTR Acoustical and Insulation Sealant, Pecora Corp.
 - b. SHEETROCK Acoustical Sealant, United States Gyp Co.
- C. Corner Beads, Edge Trim, and Control Joints: Galvanized steel, or plastic, complying with ASTM C1047. Sheet steel zinc-coated by hot-dip process.
 - 1. Shapes indicated below by reference to Fig. 1 designations in ASTM C1047:
 - a. Provide metal cornerbead on outside corners, unless otherwise indicated on Drawings.
 - b. LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim unless otherwise indicated.
 - c. L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.
 - d. One-piece control joint formed with V-shaped slot, with removable strip covering slot opening.
- D. Aluminum Accessories: Where indicated, provide manufacturer's standard extruded aluminum accessories of profile indicated or referenced by manufacturer's product designations, complying with the following requirements:
 - 1. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of finish indicated and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B221 for alloy and temper 6063-T5.
 - 2. Class II Clear-Anodized Finish: AA-C12C22A3 1 (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: etched, medium matte; Anodic
- E. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
 - 1. Joint Tape: Provide paper reinforcing tape, unless otherwise indicated.
 - 2. Setting-Type Joint Compounds for Gypsum Board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.
 - a. Where setting-type joint compounds are indicated as a taping compound only or for taping and filling only, use formulation that is compatible with other joint compounds applied over it.
 - b. For pre-filling gypsum board joints, use formulation recommended by gypsum board manufacturer for this purpose.
 - c. For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by the gypsum board manufacturer for this purpose.
 - d. For topping compound, use sandable formulation.

3. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.
 - a. Ready-Mixed Formulation: Factory-mixed product.
 - b. Job-Mixed Formulation: Powder product for mixing with water at Project site.
 - c. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
 - d. Topping compound formulated for fill (second) and finish (third) coats.
- F. Screws: ASTM C1002; self-drilling type unless otherwise noted. Provide corrosion resistant coated steel drill screws in accordance with manufacturer recommendations at all exterior and wet interior locations.
- G. Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum panels.
- H. Fastening Adhesive for Metal: Special adhesive recommended for laminating gypsum panels to steel framing.
- I. Anchorage to Substrate: Corrosion resistant tie wire, nails, screws, fasteners, sealants and other metal supports, of type and size to suit application; to rigidly secure materials in place.
- J. Post-Installed Anchors in Concrete: Chemical, or Expansion, fabricated from corrosion-resistant materials, with holes or loops for attaching hanger wires, and with capability to sustain, without failure, a load equal to 5 times that imposed by ceiling construction, as determined from testing in accordance with ASTM E488 conducted by an Independent Testing Laboratory.
- K. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing in accordance with ASTM E1190 conducted by an Independent Testing Laboratory.
- L. Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper. 0.1620- inch (8 gauge) diameter.
- M. Hanger Rods: Mild steel and zinc-coated or protected with rust-inhibitive paint.
- N. Flat Hangers: Mild steel and zinc-coated or protected with rust-inhibitive paint.
- O. Angle-Type Hangers: Angles with legs not less than 7/8-inch-wide, formed from 0.0635-inch-thick galvanized steel sheet complying with ASTM A446 Coating Designation 090, with bolted connections and 5/16-inch-diameter bolts.
- P. Elastomeric Spray-Applied Membrane:
 1. CP 672 Fire Spray by Hilti Construction Chemicals
 2. Metacaulk 1200 and Biostop 750 by Rectorseal
 3. SpecSeal AS 200 Elastomeric Spray, by Specified Technologies, Inc.

2.05 FABRICATION

- A. Gypsum Board Assemblies
 1. Provide completed assemblies complying with ASTM C840 and GA-216.
 2. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:
 - a. Fire Rated Partitions, Ceilings, Soffits, Shaft Walls and Wall Head Conditions: UL listed or GA listed assemblies as detailed or indicated on Drawings on Sheet A581.

- b. ICC IBC Item Numbers: Comply with applicable requirements of ICC IBC for the particular assembly.
- c. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
- d. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL Fire Resistance Directory.

2.06 FINISHES

A. Gypsum Board

- 1. Finish gypsum board to the Levels shown in the schedule at the end of Part 3 for different applications. Finish Levels to comply with GA 214-10 "Recommended Levels of Gypsum Board Finish".
- 2. Finish water-resistant gypsum backing board forming substrate for ceramic tile to comply with ASTM C840 and board manufacturer's directions for treatment of joints behind tile.
- 3. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - a. Feather coats of joint compound so that camber is maximum 1/32 inch.
- 4. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing with Installer present for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation well in advance of time needed for coordination with other construction.

3.03 GYPSUM BOARD INSTALLATION

- A. Comply with ASTM C840 and GA-216. Install to minimize butt end joints, especially in highly visible locations.
 - 1. Gypsum Soffit Board: Install perpendicular to framing, with staggered end joints over framing members or other solid backing.
 - 2. Cementitious Backing Board: Install over steel framing members where indicated, in accordance with ANSI A108.11 and manufacturer's instructions. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.
 - 3. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum soffit board with sealant.
 - 4. Install ceiling board panels across framing to minimize the number of abutting end joints and avoid abutting end joints in the central area of each ceiling. Stagger abutting end

- joints of adjacent panels not less than one framing member. Do not install water resistant gypsum backing board at ceiling locations.
5. Install wall/partition board panels to minimize the number of abutting end joints or avoid them entirely. Stagger abutting end joints not less than one framing member in alternate courses of board. At stairwells and other high walls, install panels horizontally with end abutting joints over studs and staggered.
 6. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
 7. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Position adjoining panels so that tapered edges abut tapered edges, and field-cut edges abut field-cut edges and ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions. Avoid joints at corners of framed openings where possible.
 8. Attach gypsum panels to steel studs so that the leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
 9. Attach gypsum panels to framing provided at openings and cutouts.
 10. Form control joints and expansion joints at locations indicated and as detailed, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.
 11. Cover both faces, of steel stud partition framing with gypsum panels in concealed spaces (above ceilings), except in chase walls that are braced internally.
 - a. Except where concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 square feet in area.
 - b. Fit gypsum panels around ducts, pipes, and conduits.
 12. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations
 13. Tolerances
 - a. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.
- B. Gypsum Board Application Methods
1. Single-Layer Application: Install gypsum wallboard panels as follows:
 - a. On ceilings, apply gypsum panels prior to wall partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated. Provide firm bearing for all ends and edges.
 - b. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated, and provide panel lengths that will minimize end joints. Provide firm bearing for all ends and edges.
 - c. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 2. Double-Layer Application: Install same gypsum wallboard as scheduled for base layers and for face layers.
 - a. On ceilings, apply base layer prior to applying base layer on walls/partitions; apply face layers in same sequence. Offset face-layer joints at least 10 inches from parallel base-layer joints. Apply base layers at right angles to framing members unless otherwise indicated.
 - b. On partitions/walls, apply base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face layer joints offset at least one stud or furring member with base layer joints. Stagger joints on opposite sides of partitions.
 - c. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.

3. Wall Tile Substrates: For substrates indicated to receive thin-set ceramic tile and similar rigid applied wall finishes, comply with the following:
 - a. Install tile backer board to comply with ANSI A108.11.
 4. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:
 - a. Fasten with screws.
 5. Double-Layer Fastening Methods: Apply base layer of gypsum panels and face layer to base layer as follows:
 - a. Fasten both base layers and face layers separately to supports with screws, or as follows.
 - b. Fasten base layers with screws and face layer with adhesive and supplementary fasteners.
- C. Trim and Accessories
1. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - a. Not more than 30 feet apart on walls and ceilings over 50 feet long.
 - b. At exterior soffits, not more than 30 feet apart in both directions.
 2. Corner Beads: Install at external corners, using longest practical lengths.
 3. Edge Trim: Install at locations where gypsum board abuts dissimilar materials. Install edge trim where edge of gypsum panels would otherwise be exposed or semi-exposed. Provide edge trim type with face flange formed to receive joint compound except where other types are indicated.
 - a. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
 - b. Install L-bead where edge trims can only be installed after gypsum panels are installed
- D. Joint Treatment
1. General: Apply joint treatment at gypsum board joints (both directions); flanges of corner bead, edge trim, and control joints; penetrations; fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration and levels of gypsum board finish indicated.
 - a. Pre-fill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.
 - b. Apply joint tape over gypsum board joints except those with trim accessories having concealed face flanges not requiring taping to prevent cracks from developing in joint treatment at flange edges.
 - c. Apply joint tape over gypsum board joints and to trim accessories with concealed face flanges as recommended by trim accessory manufacturer and as required to prevent cracks from developing in joint compound at flange edges.

3.04 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.05 FIELD QUALITY CONTROL

- A. Ceiling Framing Observation: Before Contractor installs gypsum board ceilings, coordinate an above-ceiling observation with the Resident Engineer and report deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.
 1. Notify Resident Engineer 7 days in advance of date and time when Work, or part of Work, will be ready for ceiling framing observation.

3.06 CLEANING

- A. Promptly remove any residual joint compound from adjacent surfaces.

3.07 PROTECTION

- A. Provide final protection and maintain conditions, in a manner suitable to Installer that ensures gypsum board assemblies remain without damage or deterioration at time of Completion.

3.08 SCHEDULE

- A. Finish Levels
 - 1. Finish gypsum board in scheduled areas in accordance with levels defined in ASTM C840 and as scheduled below.
 - 2. Level 1: Above finished ceilings concealed from view, for ceiling plenum areas, and where indicated, unless a higher level of finish is required for fire-resistive-rated assemblies and/or sound-rated assemblies.
 - 3. Level 2: Areas where cementitious backing board panels form substrates for tiling, and where indicated.
 - 4. Level 3: Not used.
 - 5. Level 4: In all areas to receive gypsum wallboard.
 - 6. Level 5: Not used.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient molding accessories.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.
- C. Product Schedule: For resilient products. Use same designations indicated on Drawings.

1.03 QUALITY ASSURANCE

- A. Source Limitations: Obtain resilient base and accessories components from same manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.05 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

1.06 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.01 RESILIENT BASE

- A. Resilient Rubber Base:
 - 1. Basis of Design: Traditional Rubber Wall Base by Roppe
 - a. Or approved Equal.
- B. Resilient Base Standard: ASTM F 1861.
 - 1. Material Requirement: Type TS (rubber, vulcanized thermoset).
 - 2. Manufacturing Method: Group I (solid, homogeneous).
 - 3. Style: Cove (base with toe).
 - 4. Minimum Thickness: 0.125 inch.
 - 5. Height: 4 inches.
 - 6. Lengths: Coils in 120' lengths.
 - 7. Outside Corners: Job-formed.
 - 8. Inside Corners: Job formed.
 - 9. Finish: Satin.
 - 10. Color: Charcoal

2.02 RESILIENT MOLDING ACCESSORY

- A. Transition Strips: Rubber Transition Adaptor "CTA-XX-A" 1/4" to 1/8", black, by Johnsonite, or approved equal. Provide maximum lengths to minimize running joints.

2.03 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
 - 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Cove Base Adhesives: Not more than 50 g/L.
 - b. Rubber Floor Adhesives: Not more than 60 g/L.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are same temperature as the space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.03 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
 - 1. Inside Corners: Use straight pieces of maximum lengths possible.

3.04 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet and resilient floor covering that would otherwise be exposed.

3.05 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
 2. Sweep and vacuum surfaces thoroughly.
 3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Concrete.
 - 2. Cementitious Fiber Board
 - 3. Steel.
 - 4. Galvanized metal.

1.03 DEFINITIONS

- A. Gloss Level 1 (Matte or Flat): Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 3 (Eggshell): 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 4 (Satin): 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 5 (Semi-Gloss): 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. Gloss Level 6 (Gloss): 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 7 (High-Gloss): More than 85 units at 60 degrees, according to ASTM D 523.

1.04 QUALIFICATIONS

- A. Manufacturer:
 - 1. Employing full time locally available technical field representative, testing equipment, and services as necessary to perform inspections and to determine compliance with manufacturer's instructions and provisions of Contract Documents.
 - 2. Products listed by current MPI Approved Products List, except as otherwise specified.
- B. Applicator:
 - 1. Member of Painting and Decorating Contractors of America (PDCA) or Master Painters Institute (MPI).
 - 2. Employ qualified journeymen painters and with apprentices under direction of qualified journeymen, in accordance with trade regulations.

1.05 REGULATORY REQUIREMENTS

- A. Regulatory Requirements: Comply provisions of Section 014000.
- B. Volatile Organic Compounds (VOC) Emissions: Comply with US Environmental Protection Agency (EPA).

1.06 SUBMITTALS

- A. Product Data: For each type of product. Include information on each product that will be used together and their compatibility confirmed by the manufacturer's requirements; primer, intermediate, top coat. Provide preparation requirements and application instructions.
- B. Samples: For each type of paint system and in each color and gloss of topcoat.
- C. Paint Drawdown: Size not less than 10 by 10 inch for each color selected for each paint color used on project. Label back of each drawdown with manufacturer, product, color name and number, and sheen level.
- D. Product List: For each product indicated. Include printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
- E. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Apply 100 square foot area mock-ups for each accepted color and product type over interior substrates.
 - 2. Verify for color, finish, and durability on substrate prior to beginning work of this Section. Accepted mock-up may become part of finished work.
 - 3. Locate mock-ups on inconspicuous surface areas as accepted by Architect. Remove non-accepted mock-ups on permanent construction that are determined to be unsuitable for recoating by accepted products.
 - 4. Protect and retain accepted mock-ups as standard of quality for work of this Section.
- F. Installers Quality Control Procedures identifying methods of meeting safety requirements, application processes, temperature and moisture requirements, testing methods, periodic quality checks, and repair procedures.
- G. Comply with provisions of 01 78 00 Closeout Submittals.
- H. Maintenance Data: Product data sheets, manufacturer's application instructions, MSDS, product color name and number, cleaning instructions, and touch-up and repaint instructions.
- I. Because of difficulty of storage and limited shelf life, maintenance paint is not accepted. Remove paint not used from project site.
- J. Project Record Documents: Submit under provisions of Section 01 70 00:
- K. Preliminary and Final Room Finish Schedule in editable electronic format with room numbers listed for each room, paint color, paint number, finish, and sheen identified.

1.07 QUALITY ASSURANCE

- A. Surface Preparation: Comply with MPI Architectural Painting Specifications Manual, SSPC, manufacturer's instructions, and as needed for substrates free of conditions that may impair adhesion and uniformity: Include provisions to prevent following:
 - 1. Bond breakers, dust, and foreign matter.
 - 2. Bleed-through of substrate material.
 - 3. Surface irregularities.
- B. Paint System Application: Comply with MPI Architectural Painting Specifications Manual, and manufacturer's instructions.

- C. Paint Grade: Conform to MPI, Premium Grade of normally one primer coat and two finish coats. Provide additional coats as necessary to completely cover surface. No holidays and other surface imperfections accepted.
- D. Dry Film Thickness (DFT) and Wet Film Thickness (WFT): As instructed by manufacturer or each product

1.08 PRE-INSTALLATION CONFERENCE

- A. Attendance: Contractor's site superintendent and project manager, painting subcontractor's foreman, Owner, Architect, and others as requested to attend.
- B. Meet minimum three weeks prior to beginning work of this Section.
- C. Verify conformance of proposed painting work and conforming to specified requirements.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in other Part 2 articles for the paint category indicated.

2.02 PAINT, GENERAL

- A. Manufacturers:
 - 1. Sherwin-Williams
 - 2. Kelly-Moore
- B. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- C. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- D. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- E. Colors: Match Architect's samples.

2.03 WATER-BASED PAINTS

- A. Primer, Rust-Inhibitive, Water Based: MPI #107.
 - 1. Sherwin-Williams, Pro Industrial, Pro-Cryl Universal Primer, B66W310.
 - 2. Kelly-Moore Industrial Coatings – HP DTM Metal Primer/Finish, 5725-100.
- B. Primer, Galvanized, Water Based: MPI #134.
 - 1. Sherwin-Williams, Pro Industrial, Pro-Cryl Universal Primer, B66W310.

- C. Finish for Exterior Cementitious Fiber Wall surfaces:
 - 1. Latex, Exterior, Institutional Low Odor/VOC, Semi-Gloss (Gloss Level 5): MPI #147.
 - 2. Products:
 - a. Sherwin-Williams, Pro Industrial Acrylic Semi-Gloss Coatings.
 - b. Kelly-Moore, 1520 Enviro-Coat Zero VOC 100% Acrylic Semi-Gloss.

2.05 HIGH PERFORMANCE COATINGS

- A. Existing Roof Flashing Substrates:
 - 1. Two component, aliphatic acrylic modified polyurethane system:
 - a. Surface preparation to SSPS-SP3.
 - b. Three coat system, 9-11 mils finished thickness.
 - c. Zinc rich epoxy primer (Zinc clad II Plus) compatible with intermediate and top coat.
 - d. Semi-gloss finish.
 - 2. Products:
 - a. Basis of Design: Sherwin Williams, Corothane II
 - b. Alternate manufacturer: Tnemec, or approved equal.
- B. Galvanized-Metal Substrates:
 - 1. Two component, aliphatic acrylic modified polyurethane system:
 - a. Surface preparation to SSPS-SP1 and SSPC-SP2.
 - b. Tile-clad high solids primer compatible with intermediate and top coats.
 - c. Three coat system, 9-11 mils finished thickness.
 - d. Semi-gloss finish.
 - 2. Products:
 - a. Basis of Design: Sherwin Williams, Corothane II
 - b. Alternate manufacturer: Tnemec, or approved equal.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove all loose, damaged, worn, and failing paint and primer at existing roof flashing at gutter to SSPC-SP3 standards. Prepare surfaces for primer, and subsequent finish coats.
- C. Remove loose and damaged paint on exterior of building to be repainted. Prepare existing surface adjacent to new work for re-painting per manufacture recommendations. Repaint new and existing areas to clear break lines.
- D. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie

coat as required to produce paint systems indicated.

2. For galvanized surfaces, fully clean with chemicals and procedures recommended by paint manufacturer for optimal adhesion of primer with SSPC-SP1 cleaning method.

3.02 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.04 CLEANING AND PROTECTION

- A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.
 - 1. Concrete.
 - 2. Steel.
 - 3. Galvanized metal.
 - 4. Wood.
 - 5. MDF
 - 6. Gypsum wall board.

1.03 DEFINITIONS

- A. Gloss Level 1 (Matte or Flat): Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3 (Eggshell): 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4 (Satin): 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5 (Semi-Gloss): 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6 (Gloss): 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7 (High-Gloss): More than 85 units at 60 degrees, according to ASTM D 523.

1.04 QUALIFICATIONS

- A. Manufacturer:
 - 1. Employing full time locally available technical field representative, testing equipment, and services as necessary to perform inspections and to determine compliance with manufacturer's instructions and provisions of Contract Documents.
 - 2. Products listed by current MPI Approved Products List, except as otherwise specified.
- B. Applicator:
 - 1. Member of Painting and Decorating Contractors of America (PDCA) or Master Painters Institute (MPI).
 - 2. Employ qualified journeymen painters and with apprentices under direction of qualified journeymen, in accordance with trade regulations.

1.05 REGULATORY REQUIREMENTS

- A. Regulatory Requirements: Comply provisions of Section 01 40 00.
- B. Volatile Organic Compounds (VOC) Emissions: Comply with US Environmental Protection Agency (EPA)

1.06 SUBMITTALS

- A. Product Data: For each type of product. Include information on each product that will be used together and their compatibility confirmed by the manufacturer's requirements; primer, intermediate, top coat. Provide preparation requirements and application instructions.
- B. Samples: For each type of paint system and in each color and gloss of topcoat.
- C. Paint Drawdown: Size not less than 10 by 10 inch for each color selected for each paint color used on project. Label back of each drawdown with manufacturer, product, color name and number, and sheen level.
- D. Product List: For each product indicated. Include printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
- E. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Apply 100 square foot area mock-ups for each accepted color and product type over interior substrates.
 - 2. Verify for color, finish, and durability on substrate prior to beginning work of this Section. Accepted mock-up may become part of finished work.
 - 3. Locate mock-ups on inconspicuous surface areas as accepted by Architect. Remove non-accepted mock-ups on permanent construction that are determined to be unsuitable for recoating by accepted products.
 - 4. Protect and retain accepted mock-ups as standard of quality for work of this Section.
- F. Installers Quality Control Procedures identifying methods of meeting safety requirements, application processes, temperature and moisture requirements, testing methods, periodic quality checks, and repair procedures.
- G. Comply with provisions of 01 78 00 Closeout Submittals.
- H. Maintenance Data: Product data sheets, manufacturer's application instructions, MSDS, product color name and number, cleaning instructions, and touch-up and repaint instructions.
- I. Because of difficulty of storage and limited shelf life, maintenance paint is not accepted. Remove paint not used from project site.
- J. Project Record Documents: Submit under provisions of Section 01 70 00:
- K. Preliminary and Final Room Finish Schedule in editable electronic format with room numbers listed for each room, paint color, paint number, finish, and sheen identified.

1.07 QUALITY ASSURANCE

- A. Surface Preparation: Comply with MPI Architectural Painting Specifications Manual, SSPC, manufacturer's instructions, and as needed for substrates free of conditions that may impair adhesion and uniformity: Include provisions to prevent following:
 - 1. Bond breakers, dust, and foreign matter.
 - 2. Bleed-through of substrate material.
 - 3. Surface irregularities.
- B. Paint System Application: Comply with MPI Architectural Painting Specifications Manual, and manufacturer's instructions.
- C. Paint Grade: Conform to MPI, Premium Grade of normally one primer coat and two finish coats. Provide additional coats as necessary to completely cover surface. No holidays and other surface imperfections accepted.
- D. Dry Film Thickness (DFT) and Wet Film Thickness (WFT): As instructed by manufacturer or each product

1.08 PRE-INSTALLATION CONFERENCE

- A. Attendance: Contractor's site superintendent and project manager, painting subcontractor's foreman, Owner, Architect, and others as requested to attend.
- B. Meet minimum three weeks prior to beginning work of this Section.
- C. Verify conformance of proposed painting work and conforming to specified requirements.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide product available products that may be incorporated into the Work include, but are not limited to products listed in other Part 2 articles for the paint category indicated.

2.02 PAINT, GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
 - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 3. Supply each coating material in quantity required to complete entire project's work from a single production run.
 - 4. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure

is specifically described in manufacturer's product instructions.

- B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
 - 1. Gypsum Board: Interior Latex Primer Sealer; MPI #50.
 - 2. Concrete: Alkali Resistant Water Based Primer; MPI #3.
 - 3. Wood: Latex Primer for Interior Wood; MPI #39.
 - 4. Steel, Uncoated: Anti-Corrosive Alkyd Primer for Metal; MPI #79.
 - 5. Steel -- Shop Primer: Interior/Exterior Quick Dry Alkyd Primer for Metal; MPI #76.
 - 6. Galvanized Steel: Interior Water Based Galvanized Primer; MPI #134.
 - 7. Aluminum: Interior/Exterior Quick Dry Primer for Aluminum; MPI #95.
- C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- D. Colors: Refer to Finish Schedule shown on the drawings for Paint Colors. If not indicated, match Architect's samples.
 - 1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.
- E. Acceptable Manufacturers, or approved equal:
 - 1. Sherwin-Williams
 - 2. Kelly-Moore
- F. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- G. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- H. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.03 PRIMERS/SEALERS

- A. Primer Sealer, Institutional Low Oder/VOC, Interior: MPI #134.
 - 1. Sherwin Williams, Pro Industrial, Pro-Cryl Universal Primer, or as compatible with intermediate and top-coats.

2.04 METAL PRIMERS

- A. Primer, Rust-Inhibitive, Water Based: MPI #107.
 - 1. Sherwin-Williams, Pro Industrial, Pro-Cryl Universal Primer, B66W310.
 - 2. Kelly-Moore Industrial Coatings – HP DTM Metal Primer/Finish, 5725-100.
- B. Primer, Galvanized, Water Based: MPI #134.
 - 1. Sherwin-Williams, Pro Industrial, Pro-Cryl Universal Primer, B66W310.

2.05 WATER-BASED ACRYLIC PAINTS

- A. Gypsum Board Substrates:
 - 1. Institutional Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #134.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, Eggshell (Gloss Level 3), MPI #139.
 - 2. Products:
 - a. Sherwin-Williams, Pro Industrial Multi-Surface Acrylic, Eg-Shel
 - b. Sherwin-Williams, Pro Industrial Acrylic, Eg-Shel
 - c. Kelly-Moore, Premium Dura-Poxy 100% Acrylic Int/Ext Eggshell Enamel.
- B. Gypsum Board Substrates in Wet areas: Kitchen, Restrooms:
 - 1. Institutional Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #134.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, Gloss (Gloss Level 6), MPI #114.
 - 2. Products:
 - a. Sherwin-Williams, Pro Industrial Multi-Surface Acrylic, Gloss.
 - b. Sherwin-Williams, Pro Industrial Acrylic, Gloss.
 - c. Kelly-Moore, Dura-Poxy +, 100% Acrylic Interior/Exterior Gloss Enamel.
- C. Concrete or Masonry Substrates, Non-traffic Surfaces:
 - 1. Institutional Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #134.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, Semi-gloss (Gloss Level 5), MPI #147.
 - 2. Products:
 - a. Sherwin-Williams, Pro Industrial Acrylic Semi-Gloss Coatings.
 - b. Kelly-Moore, 1520 Enviro-Coat Zero VOC 100% Acrylic Interior Semi-Gloss.
- D. Steel Substrates:
 - 1. Institutional Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer, rust-inhibitive, water based MPI #107.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, Semi-gloss (Gloss Level 5), MPI #147.
- E. Galvanized-Metal Substrates:
 - 1. Institutional Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer, galvanized, water based, MPI #134.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147.
- F. Wood Substrates: Including Architectural Woodwork panels.
 - 1. Institutional Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer, latex, for interior wood, MPI #39.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, Eggshell (Gloss Level 3), MPI #145.

3.02 WATER-BASED ACRYLIC, CLEAR

1. Wood Substrates: Including MDF wall panel, wainscot, and trims: Water Borne Acrylic Clear, Acrylic, Interior, Semi-Gloss (Gloss Level 5): MPI #129.
2. Products:
 - a. Sherwin-Williams, Minwax, Polycrylic Semi-Gloss
 - b. Benjamin Moore, Acrylic Urethane – low lustre 423-00

PART 3 – EXECUTION

3.03 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Concrete: 12 percent.
 2. Wood: 10 percent.
 3. Gypsum Board: 17 percent.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.04 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

3.05 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.06 CLEANING AND PROTECTION

- A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION

SECTION 12 21 13 – HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Horizontal louver blinds with aluminum slats.
 - 2. Privacy mini-blinds at exterior windows, interior relites, sidelites, and doors.

1.3 Related Requirements:

- 1. Division 06 Section "Rough Carpentry" for wood blocking and grounds for mounting horizontal louver blinds and accessories.

1.4 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Samples: For each exposed finish and for each color and texture required.
- C. Shop Drawings: Show fabrication and installation details for horizontal louver blinds.
- D. Window Treatment Schedule: Use same room designations indicated on Drawings.
- E. Maintenance data.

1.5 QUALITY ASSURANCE

- A. Horizontal Louver Blinds Fire-Test-Response Characteristics: Provide products passing flame-resistance testing according to NFPA 701 by a testing agency acceptable to authorities having jurisdiction.
- B. Corded Window Covering Product Standard: Unless otherwise indicated, comply with WCMA A 100.1.

PART 2 - PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Hunter Douglas Window Fashions;
 - 2. Levolor Contract;
 - 3. Or approved Equal.
- B. Finish: Ionized coating; antistatic, dust-repellent, baked polyester.
 - 1. Slats: One color as indicated.
 - 2. Match louver slats as indicated.

3. Component Color: Rails, cords, ladders, and exposed-to-view metal and plastic matching or coordinating with slat color.
 4. Colors, Textures, Patterns, and Glosses: As selected from manufacturer's full range.
- C. Louver Slats: Aluminum, alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radiused corners.
1. Miniblinds:
 - a. Nominal Slat Width: 1 inch.
 - b. Slat Spacing: Manufacturer's standard.
 2. Nominal Slat Thickness: Not less than 0.008 inch.
- D. Headrail: Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and ends.
- E. Headrail/Valance: Decorative, integrated headrail/valance not requiring a separate valance or end brackets for finished appearance; formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and ends.
1. Motorized Operating Mechanisms: Coordinate headrail with motorized operator requirements. Provide headrail acceptable to blind and motorized operator manufacturers and suitable for applications indicated.
- F. Bottom Rail: Formed-steel or extruded-aluminum tube, sealed with plastic or metal capped ends; with enclosed and protected ladders and tapes to prevent their contact with sill.
1. Top contoured to match crowned shape of louver slat.
 2. Bottom contoured for minimizing light gaps.
- G. Tilt Control: Enclosed worm gear mechanism, slip clutch or detachable wand preventing over-rotation, and linkage rod.
1. Tilt Operation: Manual with clear-plastic wand operated tilter
 2. Length of Tilt Control: Length required to make operation convenient from floor level.
 3. Tilt: Full.
- H. Lift Operation: Manual, cord lock; locks pull cord to stop blind at any position in ascending or descending travel.
- I. Ladders: Evenly spaced to prevent long-term louver sag.
1. Material: Braided string.
- J. Valance: Manufacturer's standard.
- K. Mounting: Wall, permitting easy removal and replacement without damaging blind or adjacent surfaces and finishes; with spacers and shims required for blind placement and alignment indicated.
1. Provide intermediate support brackets if end support spacing exceeds spacing recommended by manufacturer for weight and size of blind.

2.2 FABRICATION

- A. Product Standard and Description: Comply with AWCMA Document 1029, unless otherwise indicated.
- B. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.

1. Lifting and Tilting Mechanisms: With permanently lubricated moving parts.
- C. Unit Sizes: Fabricated in sizes to fill window and other openings as follows, measured at 74 deg F:
 1. Blind Units Installed between (Inside) Jamb:
 - a. Width: Equal to 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch, less than jamb-to-jamb dimension of opening in which each blind is installed.
 - b. Length: Equal to 1/4 inch, plus or minus 1/8 inch, less than head-to-sill dimension of opening in which each blind is installed.
 2. Blind Units Installed Outside Jamb: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- D. Installation Brackets: Designed for easy removal and reinstallation of blind, for supporting headrail, valance, and operating hardware, and for hardware position and blind mounting method indicated.
- E. Installation Fasteners: Not fewer than two fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, locations of connections to building electrical system, and other conditions affecting performance.
 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install blinds level and plumb and aligned with adjacent units according to manufacturer's written instructions. Install intermediate support as required to prevent deflection in headrail. Allow clearances between adjacent blinds and for operating glazed opening's operation hardware, if any.
 1. Location: Exterior louver edges in any position are not closer than to interior face of glass.
- B. Jamb Mounted: Install headrail flush with face of opening jamb and head.
- C. Adjusting: Adjust horizontal louver blinds to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- D. Cleaning: Clean blind surfaces after installation, according to manufacturer's written instructions.

3.3 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain systems.

3.4 EXTENT

- A. Provide horizontal louver blinds at all door lites, door sidelites, and relites at the following locations:
1. Office 151: Type F6 frame at north wall.
 2. Administration 150: Type F2 and F3 frames at north and west walls.

END OF SECTION 12 21 13

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Basic general electrical requirements.

1.02 WORK INCLUDES

- A. Description of Work: Provide supervision, labor, materials, tools, equipment/machinery, temporary power and lighting and other services necessary to complete the work for complete operations described herein and shown on the Drawings.
- B. Related Work Specified Elsewhere: The provisions and intent of the General Conditions, Special Conditions, and General Requirements apply to the work as if specified in this Section and other Sections of the Specifications. Provide the electrical work as indicated or specified in other sections of the specifications and drawings of the contract documents.
- C. Mounting details of equipment, devices, raceways, junction boxes and the like are not usually shown or specified. Provide per industry standard practice and code requirements as necessary for proper installation and operation the same as if herein specified or shown.
- D. Where items of the General Conditions or of the Special Conditions are repeated in this Section or other Sections of the Specifications, it is intended to call particular attention to or qualify them; it is not intended that any other parts of the General Conditions or Special Conditions shall be assumed to be omitted if not repeated herein.

1.03 FEES

- A. Purchase permits, licenses, and approvals required for execution of work.
- B. Pay utility charges.

1.04 CODES AND STANDARDS

- A. Execute electrical work in strict accordance with the latest edition of the National Electric Code and governing local ordinances, codes, and regulations. Assure the strict conformity of Electrical equipment, materials, construction methods, tests, and definitions with the established standards of the following in their latest adopted revision: Underwriter's Laboratories, Inc., and the National Electrical Manufacturers Association.
- B. Provide all components and items in accordance with Electrical Utility Power and Utility installation requirements for a complete and workable installation.
 - 1. Prior to preparing bid, obtain all utility installation information applicable to the work scope of this project.
 - 2. Provide equipment, grounding, conduit, cabinets, and all components required by utility standards.

1.05 REFERENCE DOCUMENTS

- A. These Specifications and Drawings are intended to cover a completed installation of systems. The omission of expressed reference to any item of labor or material for the proper execution of the work in accordance with present practice of the trade shall not relieve the Contractor from providing such labor and materials. Refer to the Drawings and Shop Drawings of other trades for additional details, which affect the proper installation of this work.
- B. Documents, codes and standards indicated in these Contract Documents are hereby incorporated by reference. Each and every provision contained in these documents applies to this project.

1.06 CONTRACTOR QUALIFICATIONS

- A. Contractor shall be licensed and qualified to perform the work described in these Contract Documents. Qualifications shall include the following:
 - 1. Contractor's prime business location shall be within 75 statute miles of the project.
 - 2. Contractor shall have experience successfully performing at least 3 projects of similar design and scope.
 - 3. Contractor shall understand and includes all utility requirements that may not be indicated in the Contract Documents.
 - 4. Contractor shall understand provisions of referenced codes and comply with each and every item applicable to this project.
- B. Failure to understand and include all required labor, material and provisions required by applicable codes, industry standards and utility requirements indicates inexperience and misrepresentation of Contractor's qualifications and experience. No additional compensation will be provided to the Contractor as a result of this condition.

1.07 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications stating that materials comply with requirements.

1.08 SUBSTITUTIONS

- A. The equipment specification may also show on the Drawings the type, appearance, rating, and basic quality desired.

1.09 DEFINITIONS

- A. The word "provide" as used in these Specifications and on the Drawings shall mean, "Furnish and install and complete connection per factory instructions".

1.10 WORKMANSHIP

- A. Furnish and install all equipment included in the Contract to provide completed systems with neat, finished appearance, using approved methods of the trade. Only good

workmanship will be accepted. If, in the judgment of the Owner's Representative, any portion of work not installed in a workmanlike manner or left in a rough, unfinished condition, remove the equipment, reinstall same, patch and paint surrounding surfaces satisfactory to the Owner's Representative, with no increase in cost.

1.11 CONTRACTOR'S COST BREAKDOWN

- A. Prepare a schedule of values in accordance with the following categories. Include this information into the Division 1 schedule of values, and submit directly to the Owner's Representative with the submittals.
 - 1. Mobilization, Permit, Insurance
 - 2. Raceway, Boxes, and Fittings
 - 3. Wire and Feeders, Lugs and Connectors
 - 4. Main Switchboard and Service
 - 5. Panel Boards
 - 6. Low Voltage Transformers
 - 7. Testing and Project Close-Out

- B. Material must be on the jobsite before request is made for payment unless arrangements are approved by the Owner's Representative.

1.12 WARRANTY

- A. Warranty workmanship and components of the work for a period of one-year from the date of final acceptance. Remedy any defects in workmanship and repair or replace any faulty equipment that fails within the warranty period without additional cost to the Owner. Assure cleanliness at the time of final acceptance.

1.13 AS-BUILT DRAWINGS

- A. Maintain a set of Contract Plans at the site on which current changes and the actual location of conduits, devices, equipment, etc., as installed marked in red pencil in a legible, neat manner. Drawings shall be available for review by the Owner's Representative during normal project working hours.

- B. Drawings shall be updated Daily and indicate:
 - 1. Actual dimensions.
 - 2. Conduits, equipment and devices installed inside building.
 - 3. Modifications to project change orders, panel schedule revisions, etc.
 - 4. Stamp final drawings "AS BUILT" with date, signature of contractor license holder and electrical contractor license number affixed to each sheet.

1.14 FINAL DOCUMENTS

- A. Submit the following final documents at project completion.
 - 1. As-built drawings.
 - 2. Documents reviewed and approved by code enforcement agencies.
 - 3. Bind three complete sets of the following in a hard backed 3-ring binder:
 - a. Letter from the Electrical Contractor stating that the Electrical portion of the project is complete and that all punch list items has been completed.
 - b. Guarantee letter.

- c. Electrical Inspection Certificate.
- d. Copies of all permits.
- e. Operating and Maintenance Manuals, operating instructions.
- f. Guarantees (other than one year).

1.15 MAINTENANCE AND OPERATIONS MANUALS

- A. Provide Operation and Maintenance Manual.
 - 1. Within 30 days of substantial completion, provide one preliminary bound set of Operation and Maintenance Manuals including maintenance information and parts list furnished by the manufacturer with the equipment, together with supplementary drawings where necessary to itemize serving and maintenance points. Include periodic maintenance, methods of operation, seasonal requirements, manufacturer's data and warranty forms. Provide address and 24-hour phone number of firm responsible under warranty. Items requiring service or correction during the warranty period shall be serviced within 24-hours of notification by Owner. Data in manuals shall be neat, clean copies and posted on 8-½" x 11" sheets, typed, operation and maintenance instructions for each item of equipment installed. Drawings shall be accordion folded. An index shall be provided with all contents listed in an orderly presentation according to Specification Section.
 - 2. Number of Copies: The preliminary set of the O&M Manual shall be presented to the Owner's Representative for review of content. After this set has been reviewed and accepted, two additional copies shall be provided.
 - 3. Binding: Binders shall be as specified in accordance with Division 1, or if not specified in Division 1, binders shall be single touch, locking, D-Ring Type. Covers shall be black printed with the name of the job, Owner, Engineer, Contractor, and the year of completion. The back edge shall be imprinted with the name of the job, the Owner, and the year of completion. Each copy shall have typewritten index and tabbed dividers between equipment categories. Binder shall have sufficient capacity to contain all data sheets and not exceed 3/4 of fill capacity.
 - 4. Electronic copy of all items listed above shall also be provided on CD.

1.16 SCHEDULING, DELIVERY AND STORING

- A. Schedule materials, equipment and deliveries and make all arrangements as necessary to complete all work in accordance with the project construction schedules. Provide schedules of work to the Owner's Representative as directed during construction.
- B. Schedule deliveries and unloading to prevent traffic congestion, blocking of access, and interference with work. Arrange deliveries to avoid larger accumulations than can be suitably stored at site. Provide for continuity of supply to avoid change of supplier or change in brand of materials during any phase of work.
- C. Deliver packaged materials to site in manufacturer's original, unopened, labeled containers. Do not open containers until approximate time for use. Store materials at locations that will not interfere with progress of work. Arrange locations of storage areas in approximately order of intended use.
- D. Store materials in a manner that will prevent damage to materials or structure, and that will prevent injury to persons. Store cementitious materials in dry, weathertight, ventilated spaces. Store ferrous materials to prevent contact with ground and to avoid rusting and damage from weather.

- E. Provide documentation to the Owner's Representative for any claim of material, equipment not able to meet construction schedules.

1.17 SITE EXAMINATION

- A. Before submitting bid, Contractor shall visit the site.
 - 1. Examine existing conditions.
 - 2. Verify requirements for temporary electrical power.
 - 3. Verify requirements for permanent power requirements.
 - 4. Identify existing conditions and requirements for cutting, patching, excavation, etc.
 - 5. Include all costs to provide the electrical installation associated with the existing conditions for the best workmanship and operation according to the intent of Specifications and Drawings.
 - 6. Report to the Owner's Representative any condition that might prevent the installation of equipment in the manner intended.
- B. Additional cost (change order) will not be approved due to Contractor's failure to comply with the above site examination of existing conditions and include all items required for a complete and workable installation.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Naming of manufacturers indicates the manufacturer's brand name is acceptable only if their product is in compliance with each and every provision of this specification. Failure to comply will result in disapproval.
- B. Supplier and/or Electrical Contractor shall be responsible to ensure that material or equipment is of same size, quality, capacity, weight, and electrical characteristics as that specified. The Contractor/supplier shall pay any changes and costs required during construction due to Contractors/supplier neglect to properly select equipment.
- C. Notify Owner's Representative for an on-site visit to inspect material and equipment prior to installation.
- D. Materials and equipment shall be new, undamaged, and shall be UL listed for its use.
- E. Defects and damages of material shall be replaced, furnish any new material as necessary and install the system at the Contractor's expense.
- F. Furnish material and equipment samples when requested by the Owner's Representative, within 7-days of request.
- G. Non-approved material and equipment must be removed from the jobsite.

2.02 DOOR PUSHBUTTON SYSTEM

- A. Provide FlexPower FP0250-C8E1 or approved equal system.

PART 3 - EXECUTION

3.01 GENERAL

- A. Provide conduit, wiring and all components indicated on schedules and diagrams.
- B. Before any installation, devices or equipment can be directed or located by the Owner's Representative within 20' of the designed contract location without extra cost.
- C. Device or equipment mounting height given herein the Specifications, Contract Drawing, and/or documents are intended to provide general guidelines pursuant to industry standards. Such guidelines may not be exact or accurate and may or may not conflict with other trades installation without verification.
- D. Provide field coordination and verification and ensure that such mounting heights if indeed are practical and feasible as not to conflict with other installation and construction. If conflicts are discovered at any time during the construction, report to the Owner's Representative immediately for resolution.
- E. If the Contractor fails to provide such coordination and field verification and results of erroneous installation, the Contractor shall remedy such installation per Owner's Representative direction, at Contractor's cost.

3.02 MANUFACTURER'S DIRECTIONS

- A. Apply, install, connect, and erect manufactured items or materials according to the recommendations, wiring diagrams, instructions of the manufacturer when such recommendations are not illustrated or in conflict with the Contract Documents.
- B. Furnish to the Owner's Representative on request, copies of manufacturer's recommendations. Secure approval of recommendations before proceeding with work.
- C. Keep at the site not less than one copy, in good condition, of manufacturer's recommendations, wiring diagrams, instructions, or directions, pertaining to work at the site. Inform involved personnel of requirements and availability of manufacturer's recommendations.

3.03 UTILITY STANDARDS

- A. All work associated with electrical power utility shall be installed in accordance with the standards and specifications established by the serving utility.
- B. Contact electrical power utility. Verify and coordinate work scope prior to commencement of installation.

3.04 PREPARATORY WORK

- A. Inspection: Prior to all work of this Section, carefully inspect the work of other trades and verify the completeness of such work to the point where this work may properly commence.
- B. Discrepancies: Do not proceed with the work in the event of a discrepancy until resolved by the Owner's Representative.

3.05 COORDINATION

- A. The drawings are diagrammatic and indicate generally the locations of materials and equipment.
These drawings shall be followed as closely as possible.
- B. Provide detailed wiring diagrams for equipment and component interconnection when requested by the Owner's Representative.
- C. Coordinate and verify exact locations of equipment prior to beginning of rough-in.
- D. If directed by the Owner's Representative, the Contractor shall, without extra charge, verify with local inspectors or authorities having jurisdiction and make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.
- E. If directed by the Owner's Representative, the Contractor shall, without extra charge, provide layouts of equipment and details of mounting method for review, prior to installation to ensure proper execution of the work.

3.06 RACEWAYS

- A. One-line diagrams, risers, and conduit routing are schematic and are not showing exact physical arrangement of equipment. Where indicated on Drawings, junction boxes and pull boxes are minimum requirements. Provide other fittings and pull boxes of adequate size in the raceway system wherever necessary or required by National Electrical Code. Allow a maximum of four-quarter bends between pull boxes in each run of conduits. Provide expansion joint fittings for conduits passing through new or existing expansion joints installed between buildings. Verify exact locations and details of expansion joints prior to work. Coordinate conduit routing, pull box and equipment locations with other trades to avoid conflicts of equipment installations. Empty conduits shall have pull wires. Provide unistrut mounting channels, hanger rods, anchor bolts and fittings to support conduits and pull boxes. Work shall comply with National Electrical Code requirements.

3.07 MISCELLANEOUS

- A. Support all conduits and equipment in accordance with the National Electrical Code and the International Building Code.
- B. Cutting and Patching: Perform cutting and patching as may be necessary for the proper installation of the electrical work. Grout around raceway penetrations and fill anchor bolt holes or spalled areas.

- C. Cleanup: The premises must be kept free of accumulated materials, rubbish, and debris at all times. Surplus material, tools, and equipment must not be stored at the building. At the completion of the job, equipment shall be left clean and in proper condition for their intended use.
- D. Demolition: Electrical demolition shall be performed by the Electrical Contractor as indicated on Plans and other sections of this document.
- E. Tests: Test wiring and electrical equipment to verify absence of grounds and short circuits and verify proper operation, rotation, and phase relationship. Demonstrate operation of all equipment in accordance with the requirements of this specification and the manufacturer's recommendations. Perform tests in the presence of the Owner's Representative. Provide instruments and personnel required to conduct these tests.

3.08 INSTRUCTION PERIODS FOR OWNER'S PERSONNEL

- A. Scope: Following installation of work, have representatives of installation tradesmen conduct demonstrations and instruction periods to point out locations of servicing points and required points of maintenance to Owner's Representative.
- B. General Description Of Instruction Periods: Each period shall include preliminary discussion, and presentation of information from maintenance manuals with appropriate references to Drawings; followed by tours of building areas explaining maintenance requirements, access methods, servicing and maintenance procedures, and equipment cleaning procedures, control settings and available adjustments.
- C. Scheduling of Instruction Periods: Notice of Contractor's readiness to conduct such instruction and demonstration shall be given to the Owner's Representative at least two-Day prior to the instruction periods, and agreement reached as to the date at which the instruction periods are to be performed. Obtain approvals of proposed date prior to making final arrangements.

END OF SECTION

PART 1 - GENERAL

- 1.01 SECTION INCLUDES
- A. Electrical demolition.

PART 2 - PRODUCTS

- 2.01 MATERIALS AND EQUIPMENT
- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 - EXECUTION

- 3.01 EXAMINATION
- A. Verify that abandoned wiring and equipment serve only abandoned facilities.
 - B. Report discrepancies to Owner before disturbing existing installation.
 - C. Beginning of demolition means installer accepts existing conditions.
- 3.02 PREPARATION
- A. Disconnect electrical systems to be removed.
 - B. Coordinate utility service outages with utility company.
 - 1. Notify Owner at least 24 hours before partially or completely disabling system.
- 3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK
- A. Remove, relocate, and extend existing installations to accommodate new construction.
 - B. Identify circuit source of supply and equipment effected by demolition.
 - C. Repair adjacent construction and finishes damaged during demolition and extension work. Restore finishes to same quality before demolition work commenced.
 - D. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
 - E. All demoed equipment shall become the property of the owner unless they decide not to keep any part of it; in that case the contractor shall remove from site.
- 3.04 CLEANING AND REPAIR
- A. Clean and repair existing materials and equipment that remain or that are to be reused.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Underground feeder and branch-circuit cable.
- C. Service entrance cable.
- D. Wiring connectors.
- E. Electrical tape.
- F. Heat Shrink tubing.
- G. Oxide inhibiting compound.
- H. Wire pulling lubricant.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 01 - Minor Electrical Demolition: Disconnection, removal, and/or extension of existing electrical conductors and cables.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Notify Owner's Representative of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.04 WIRING METHODS

- A. Wiring systems 50V and greater shall be installed in a complete raceway system.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- B. Project Record Documents: Record actual locations of components and circuits.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F (-10 degrees C), unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Owner's Representative and obtain direction before proceeding with work.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience and with service facilities within 100 miles (160 km) of Project.

PART 2 - PRODUCTS

2.01 CONDUCTORS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

2.02 WIRING REQUIREMENTS

- A. Branch Circuits.
 - 1. Provide separate grounded circuit conductor (neutral) for each undergrounded circuit conductor.

- B. Underground Locations: Use only building wire with Type XHHW insulation in raceway.

2.03 MANUFACTURERS

- A. Wire
 - 1. Cerro Wire LLC
- B. Encore Wire Corporation
 - 1. Industrial Wire & Cable, Inc.
 - 2. Southwire Company
 - 3. Belden
 - 4. West Penn
- C. Splice Connectors
 - 1. Burndy
 - 2. Ideal Industries
 - 3. 3-M
 - 4. Thomas & Betts.
- D. Terminal Lugs:
 - 1. IlSCO
 - 2. Burndy
 - 3. Anderson
 - 4. Thomas & Betts

2.04 ALL CONDUCTORS AND CABLES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose indicated.
- C. Provide new conductors and cables manufactured not more than one year prior to installation.
- D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- E. Comply with NEMA WC 70.
- F. Comply with FS A-A-59544 where applicable.
- G. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- H. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- I. Conductors for Grounding and Bonding: Also comply with Section 26 05 26.
- J. Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.

2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B 787M unless otherwise indicated.
3. Tinned Copper Conductors: Comply with ASTM B33.

2.05 SINGLE CONDUCTOR BUILDING WIRE

- A. Manufacturers:
 1. Copper Building Wire:
 - a. Cerro Wire LLC: www.cerrowire.com.
 - b. Encore Wire Corporation: www.encorewire.com.
 - c. Southwire Company: www.southwire.com.
 - d. Substitutions: See General Terms and Conditions Part 1.
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.
 2. Control Circuits: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
 - a. Size 4 AWG and Larger: Type XHHW-2.
 - b. Installed Underground: Type XHHW-2.
 2. Copper.
 3. Insulation: NFPA 70, Type THHN/THWN, 90 degree C.
 4. Solid conductor for feeders and branch circuits #10 AWG and smaller.
 5. Stranded conductors for feeders and branch circuits #8 AWG and larger.
 6. Stranded conductors for control circuits

2.06 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 26 05 26.
- C. Wiring Connectors for Splices and Taps:
 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 2. Copper Conductors Size 6 AWG and Larger: Use compression connectors.
- D. Wiring Connectors for Terminations:
 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.

3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
 4. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
 5. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
 6. Conductors for Control Circuits: Use crimped terminals for all connections.
- E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- F. Compression Connectors: Provide circumferential type or hex type crimp configuration.
1. Manufacturers:
 - a. Burndy: www.burndy.com.
 - b. IlSCO: www.ilsco.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
 - e. Substitutions: See General Terms and Conditions Part 1.
- G. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
1. Manufacturers:
 - a. Burndy: www.burndy.com.
 - b. IlSCO: www.ilsco.com.
 - c. Thomas & Betts Corporation: www.tnb.com.

2.07 WIRING ACCESSORIES

- A. Electrical Tape:
1. Manufacturers:
 - a. 3M: www.3m.com.
 - b. Plymouth Rubber Europa: www.plymouthrubber.com.
 2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
 3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
 4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil (0.76 mm); suitable for continuous temperature environment up to 194 degrees F (90 degrees C) and short-term 266 degrees F (130 degrees C) overload service.
 5. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil (3.2 mm); suitable for continuous temperature environment up to 176 degrees F (80 degrees C).
 6. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil (0.18 mm); suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
 7. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90mil (2.3 mm).

- B. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
 - 1. Manufacturers:
 - a. Burndy: www.burndy.com.
 - b. Ideal Industries, Inc.: www.idealindustries.com.
 - c. IlSCO: www.ilSCO.com.
- C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
 - 1. Manufacturers:
 - a. 3M: www.3m.com.
 - b. American Polywater Corporation: www.polywater.com.
 - c. Ideal Industries, Inc.: www.idealindustries.com.
- D. Split Bolt Connectors.
- E. Solder less Pressure Connectors.
 - 1. Product: ILSCO, Burndy.
- F. Spring Wire Connectors.
 - 1. Product: 3M, Ideal.
- G. Compression Connectors.
 - 1. Product: Burndy, ILSCO.
- H. Vinyl Mastic Pads and Rolls.
 - 1. Self-fusing, rubber based insulating compounds laminated to a flexible, all weather vinyl (PVC) backing.
 - 2. 600-volt rated.
 - 3. Suitable for continuous submersion in water.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage wire and cable has been completed.
- B. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- C. Verify that raceway installation is complete and supported.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:
 - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 - 2. When circuit destination is indicated and routing is not shown, determine exact routing required.
 - 3. Arrange circuiting to minimize splices.

- B. Install products in accordance with manufacturer's instructions.
- C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.
- D. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure.
- G. Terminate cables using suitable fittings.
- H. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 - 3. Do not remove conductor strands to facilitate insertion into connector.
 - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
 - 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- I. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
 - 1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
 - b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
 - 2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
 - 3. Wet Locations: Use heat shrink tubing.

- J. Insulate ends of spare conductors using vinyl insulating electrical tape.
 - K. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
 - L. Identify conductors and cables in accordance with Section 26 05 53.
 - M. Use Vinyl Mastic Pads and Rolls for splices in wet locations.
 - N. Feeder Installation:
 - 1. Size feeders as shown on drawings.
 - 2. Identify according to color code standards.
 - 3. Make no splices unless shown on the Plans or specifically approved by the Owner's representative.
 - 4. Splices shall be compression sleeve type.
- 3.04 FIELD QUALITY CONTROL
- A. Perform inspections and tests listed in NETA STD ATS, Section 7.3.2. The insulation resistance Test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
 - B. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.
- F. Grounding and bonding components.
- G. Provide all components necessary to complete the grounding system(s) consisting of:
 - 1. Existing metal underground water pipe.
 - 2. Metal underground water pipe.
 - 3. Metal frame of the building
 - 5. Concrete-encased electrode.
 - 6. Existing metal underground gas piping system.
 - 7. Metal underground gas piping system.
 - 8. Rod electrodes.
 - 9. Ground Bars.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- B. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; National Electrical Manufacturers Association; 2007.
- C. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.
- D. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 5 ohms.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- B. Product Data: Provide for grounding electrodes and connections.
- C. Test Reports: Indicate overall resistance to ground and resistance of each electrode.
- D. Project Record Documents: Record actual locations of components and grounding electrodes.
- E. Certificate of Compliance: Indicate approval of installation by authority having jurisdiction.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

PART 2 - PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- D. Grounding System Resistance:
 - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Owner's Representative. Precipitation within the previous 48 hours does not constitute normally dry conditions.
 - 2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
 - 3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested according to IEEE 81 using "point-to-point" methods.
- E. Grounding Electrode System:
 - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.

- a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
2. Metal Underground Water Pipe(s):
 - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet (3.0 m) at an accessible location not more than 5 feet (1.5 m) from the point of entrance to the building.
 3. Metal Building or Structure Frame:
 - a. Provide connection to metal building or structure frame effectively grounded in accordance with NFPA 70 at nearest accessible location.
 4. Ground Rod Electrode(s):
 - a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
 5. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
- F. Grounding for Separate Building or Structure Supplied by Feeder(s) or Branch Circuits:
1. Provide grounding electrode system for each separate building or structure.
 2. Provide equipment grounding conductor routed with supply conductors.
 3. For each disconnecting means, provide grounding electrode conductor to connect equipment ground bus to grounding electrode system.
 4. Do not make any connections and remove any factory-installed jumpers between neutral (grounded) conductors and ground.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
1. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.
 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in addition to requirements of Section 26 05 19:
1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
- C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 - a. Exceptions:
 - 1)
 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
 2. Material: Copper-bonded (copper-clad) steel.

3. Size: 3/4 inch (19 mm) diameter by 10 feet (3.0 m) length, unless otherwise indicated.

2.03 GROUND BARS

- A. Copper bar with pre punched holes.
- B. UL Recognized Standoff Insulators for wall mounting.
- C. Stainless Steel Mounting Brackets, Stainless Steel Assembly Bolts and Lock Washers.
- D. Suitable for Indoor and Outdoor Installations.

2.04 CONNECTORS AND ACCESSORIES

- A. Mechanical Connectors: Bronze.
 1. Product: Mechanical Clamp manufactured by T&B.
- B. Exothermic Connections:
 1. Product: manufactured by Cadweld.
- C. Wire: Stranded copper.
- D. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.
- E. Grounding Well:
 1. Well Pipe: 8 inch (200 mm) by 24 inch (600 mm) long clay tile pipe with belled end.
 2. Well Cover: Cast iron with legend "GROUND" embossed on cover.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as shown on the drawings.
- C. Verify that conditions are satisfactory for installation prior to starting work.
- D. Verify existing conditions prior to beginning work.
- E. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

- B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
- D. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 26 05 53.
- F. Provide system and equipment grounding in accordance with the applicable codes and ordinances and as indicated on the Plans.
- G. Ground service equipment, separately derived systems, conduits, devices and equipment in accordance with NEC, Article 250.
- H. Grounding Conductor: Provide green insulated equipment grounding conductor in conduits containing wiring systems above 50V. Insulation and conductor type shall be the same for circuit or feeder conductors. Size conductors in accordance with NEC Article 250.
- I. Inspection: Place no backfill around made electrode earth grounding systems until the installation is inspected and approved by the Owner's Representative.
- J. Installation ground electrodes.
 - 1. Unless otherwise indicated, top of electrode shall be 6" below finished surface.
 - 2. Bury electrode conductor below finished surface.
- K. Provide grounding well pipe with cover at each rod location. Install well pipe top flush with finished grade.
- L. Provide bonding to meet requirements described in Quality Assurance.
- M. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

3.03 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA STD ATS except Section 4.
- B. Perform inspections and tests listed in NETA STD ATS, Section 7.13.

- C. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- D. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

PART 1 – GENERAL

1.01 GENERAL

- A. Review the Specifications and Drawings for coordination with additional requirements and information that apply to work under this Specification.

1.02 SUMMARY

- A. Furnish and install Conduit and Equipment Supports, Anchors and Fasteners.

1.03 REFERENCES

- A. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. Submit under provisions of 26 00 10 General Electrical Requirements.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for fastening systems.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Thomas & Betts Corporation
- B. Threaded Rod Company
- C. Kindorf
- D. Hilti: Kwik Bolt Expansion Anchor

2.02 MATERIALS

- A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.

- B. Supports: Fabricated of structural steel or formed steel members; galvanized.
- C. Anchors and Fasteners:
 - 1. Do not use powder-actuated anchors.
 - 2. Concrete Structural Elements: Use precast inserts, expansion anchors, or preset inserts.
 - 3. Steel Structural Elements: Use beam clamps, steel spring clips, or welded fasteners.
 - 4. Concrete Surfaces: Use expansion anchors.
 - 5. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
 - 6. Solid Masonry Walls: Use expansion anchors or preset inserts.
 - 7. Sheet Metal: Use sheet metal screws.
 - 8. Wood Elements: Use wood screws.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
 - 1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
 - 2. Obtain permission from Owner's Representative before drilling or cutting structural members.
- B. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- C. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- D. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch (25 mm) off wall.
- E. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- F. Surface mounted conduit and boxes are allowed only where CMU or Concrete walls are present. All other areas of building are to have conduit and boxes recessed in walls.

END OF SECTION

PART 1 – GENERAL

1.01 GENERAL

- A. Review the Specifications and Drawings for coordination with additional requirements and information that apply to work under this Specification.

1.02 SUMMARY

- A. Provide conduit, tubing, wireways, outlets, and pull boxes as required to permit pulling conductors and for wire splices and branches. All outlets shall be code sized junction boxes with matching cover plate for each system used.
- B. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.
- C. Connections to equipment using flexible conduit and wire connections.
- D. Wet and Damp Locations above grade: Provide rigid steel and aluminum conduit, intermediate metal conduit, or electrical metallic tubing. Provide cast metal or nonmetallic outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.
- E. Concealed Dry Locations: Provide rigid steel and aluminum conduit, intermediate metal conduit, or electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pullboxes.
- F. Exposed Dry Locations: Provide rigid steel and aluminum conduit, intermediate metal conduit, electrical metallic tubing, or surface metallic raceway. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pullboxes.

1.03 RELATED SECTIONS

- A. Section 26 05 26 "Grounding and Bonding".
- B. Section 26 05 53 "Identification for Electrical Systems".

1.04 REFERENCES

- A. ANSI C80.1 (American National Standards Institute) – Rigid Steel Conduit, Zinc Coated.
- B. ANSI C80.3 (American National Standards Institute) – Electrical Metallic Tubing, Zinc Coated.
- C. ANSI C80.6 (American National Standards Institute) – Electrical Intermediate Metal Conduit.
- D. NEMA FB 1 (National Electrical Manufacturers Association) – Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- E. NEMA OS 1 (National Electrical Manufacturers Association) – Sheet-steel Outlet Boxes, Device Boxes, Covers and Box Supports.
- F. NEMA OS 3 (National Electrical Manufacturers Association) – Selection and Installation Guidelines for Electrical Outlet Boxes.

- G. NEMA WD 1 (National Electrical Manufacturers Association) – General Purpose Wiring Devices.
- H. NEMA WD 6 (National Electrical Manufacturers Association) – Wiring Devices – Dimensional Requirements.
- I. NEMA 250 (National Electrical Manufacturers Association) – Enclosures for Electrical Equipment (1,000 Volts Maximum).
- J. UL 1 (Underwriters Laboratories) – Flexible Metal Conduit.
- K. UL 6 (Underwriters Laboratories) – Electrical Rigid Metal Conduit - Steel.
- L. UL 360 (Underwriters Laboratories) – Liquid-Tight Flexible Steel Conduit.
- M. UL 514A (Underwriters Laboratories) – Metallic Outlet Boxes.
- N. UL 514B (Underwriters Laboratories) – Conduit, Tubing and Cable Fittings.
- O. UL 797 (Underwriters Laboratories) – Electrical Metallic Tubing – Steel.
- P. UL 870 (Underwriters Laboratories) – Wireways, Auxilliary Gutters and Associated Fittings.
- Q. UL 1242 (Underwriters Laboratories) – Electrical Intermediate Metal Conduit - Steel.

1.05 GENERAL REQUIREMENTS

- A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.
- B. Connections to equipment using flexible conduit and wire connections.
- C. Wet and Damp Locations above grade: Provide rigid steel and aluminum conduit, intermediate metal conduit, or electrical metallic tubing. Provide cast metal or nonmetallic outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.
- D. Concealed Dry Locations: Provide rigid steel and aluminum conduit, intermediate metal conduit, or electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pullboxes.
- E. Exposed Dry Locations: Provide rigid steel and aluminum conduit, intermediate metal conduit, electrical metallic tubing, or surface metallic raceway. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pullboxes.
- F. Minimum Raceway Size: 1/2-inch, 3/4-inch for homeruns, unless otherwise specified.

1.06 SUBMITTALS

- A. Submit under provisions of 26 00 10 General Electrical Requirements.
- B. Submit catalog cuts for all items proposed to be furnished and installed under this Section.
- C. Product Data:

1. Flexible metal conduit.
2. Liquidtight flexible metal conduit.
3. Raceway fittings.
4. Conduit bodies.
5. Wireway.
6. Pull and junction boxes.
7. Electrical floor boxes for concrete construction.
 - a. Samples: Submit one (1) floor box with required color and finish to Owner's Representative for approval. Show standard color ranges.

1.07 CLOSEOUT SUBMITTALS

- A. Project Record Documents:
 1. Record actual routing of conduits of 1-1/2 inch trade size and larger.
 2. Record actual locations and mounting heights of outlet, pull, and junction boxes.
 3. Record actual locations, sizes, and configurations of equipment connections.

1.08 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturers regularly engaged in manufacture of electrical floor boxes and fittings of the types and sizes required, whose products have been in satisfactory use in similar service for not less than 10 years. Provide electrical floor boxes and fittings produced by a manufacturer listed in this section.
- B. Source Limitations: Obtain each type of floor box for concrete construction through one (1) source from a single manufacturer.
- C. Electrical Boxes and Fittings: Comply with requirements of applicable local codes, NEC, UL, ETL, and NEMA Standards pertaining to boxes and fittings.
- D. Floor boxes shall be approved and for on-grade concrete floors with a vapor barrier where permitted by local codes. Floor boxes shall be UL listed to their Standard UL 514A. Floor boxes shall conform to the standards set in the National Electrical Code. Floor boxes shall also have been evaluated by UL to meet the applicable U.S. safety standards for scrub water exclusion when used on tile, terrazzo, wood, and carpet covered floors.

1.09 DELIVERY, STORAGE AND HANDLING

- A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- B. Deliver floor boxes in factory labeled packages.
- C. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
- D. Protect from damage due to weather, excessive temperature, and construction operations.

1.10 COORDINATION

- A. Coordinate installation of outlet boxes for equipment connected under other Sections.
- B. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.
- C. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other Sections.

- D. Determine connection locations and requirements.
- E. Sequence rough-in of electrical connections to coordinate with installation of equipment.
- F. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 – PRODUCTS

2.01 INTERIOR WIRING

- A. General: Outlet and pull boxes shall be pressed steel, zinc coated with plaster ring where applicable. Large pull boxes shall be fabricated sheet steel; zinc coated or baked enamel finish, with return flange and screw retained cover.
- B. Surface Metal Raceway: Boxes of same manufacture and to match raceway. Boxes to accommodate standard devices and device plates.
- C. Concrete And Masonry: Boxes for casting in concrete or mounting in masonry walls shall be the type specifically designed for that purpose.
- D. General Purpose Electrical Outlet: Provide, as required for work and installation, 4" square flush junction box, 1-1/2" deep, with finished cover plates to match device type used or as noted.
- E. Telecommunications Outlet: Provide RANDL 5 series #T-55017 box for all telecommunications and voice outlets. Provide mudrings as specified.

2.02 EXTERIOR WIRING

- A. Outlet and junction boxes shall be cast or malleable iron or shall be cast of corrosion resistant alloy compatible with raceway to which it is connected. Pull boxes shall be fabricated of heavy gauge steel and hot dipped galvanized. All boxes shall be gasketed covers.

2.03 RIGID METAL CONDUIT (RMC)

- A. Rigid Steel Conduit: ANSI C80.1 and UL 6.
- B. Intermediate Metal Conduit (IMC): ANSI C80.6 and UL 1242, zinc-coated steel.
- C. Fittings and Conduit Bodies: NEMA FB 1; threaded, all steel fittings.

2.04 FLEXIBLE METAL CONDUIT

- A. Product Description: UL 1, interlocked steel construction.
- B. Fittings: NEMA FB 1.

2.05 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Product Description: UL 360, interlocked steel or aluminum construction with PVC jacket.
- B. Fittings: NEMA FB 1 and UL 514B, cadmium- or zinc-plated.

2.06 ELECTRICAL METALLIC TUBING (EMT)

- A. Product Description: ANSI C80.3 and UL 797; galvanized tubing.
- B. Fittings and Conduit Bodies: NEMA FB 1.

1. Steel.
2. Compression type.
3. Insulated throat.
4. Listed as rainproof.

2.07 METALLIC CONDUIT BODIES

- A. Product Description: UL 514B.

2.08 WIREWAY

- A. Manufacturers:
1. Hoffman.
 2. Square D.
 3. Or other reviewed and approved Manufacturers.
- B. Product Description: UL 870; General purpose type wireway.
1. NEMA 250, Type 1.
 2. Knockouts: Manufacturer's standard.
 3. Size: Per Codes.
 4. Cover: Screw cover.
 5. Fittings: Lay-in type with removable top, bottom, and sides; captive screws.
 6. Finish: Rust inhibiting primer coating with gray enamel finish.

2.09 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2-inch male fixture studs where required.
 2. Concrete Ceiling Boxes: Concrete type.
- B. Wall plates for Finished Areas: As applicable for installation.
- C. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.10 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify equipment is ready for electrical connection, for wiring, and to be energized.
- B. Verify outlet locations, routing, and termination locations of raceway prior to rough-in.

3.02 EXISTING WORK (WHERE APPLICABLE)

- A. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.
- B. Remove concealed abandoned raceway to its source.
- C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.
- D. Remove exposed abandoned equipment wiring connections, including abandoned connections above accessible ceiling finishes.

- E. Disconnect abandoned equipment and remove wiring connections. Remove abandoned components when connected raceway is abandoned and removed. Install blank cover for abandoned boxes and enclosures not removed.
- F. Extend existing equipment connections using materials and methods as specified.
- G. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel. Mark and protect all raceway not designated for modification or demolition. Replace any raceway not designated for modification or demolition that becomes damaged during the project.
- H. Extend existing raceway and box installations using materials and methods specified. Where none are specified, match existing equipment size/type being extended.
- I. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.03 INSTALLATION

- A. Install raceway and boxes in accordance with NECA "Standard of Installation".
- B. Equipment Connections:
 - 1. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
 - 2. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
 - 3. Install receptacle outlet to accommodate connection with attachment plug.
 - 4. Install cord and cap for field-supplied attachment plug.
 - 5. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
 - 6. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
 - 7. Install terminal block jumpers to complete equipment wiring requirements.
 - 8. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.
- C. Penetrate firewalls and fire-rated floors with rigid galvanized steel conduit. Extend a minimum of six inches beyond the firewall. Provide firestopping ground and bond raceway and boxes.
- D. Fasten raceway and box supports to structure and finishes.
- E. Identify raceway and boxes per Section 26 05 53 "Identification for Electrical Systems".
- F. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.04 INSTALLATION – RACEWAY

- A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.
- B. Arrange raceway supports to prevent misalignment during wiring installation.
- C. Group related raceway; support using conduit rack attached to structure. Construct rack using steel channel; provide space on each for 25 percent additional raceways.
- D. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports.
- E. Do not attach raceway to ceiling support wires or other piping systems.

- F. Install IMC and EMT for general wiring. Flexible conduit may be used only for installation within existing walls.
- G. Install flexible conduit for connection to motors, transformers and vibrating equipment, with enough length to provide at least a ninety degree bend in the flexible conduit. Use liquid-tight metallic conduit in wet, damp or exterior locations.
- H. Construct wireway supports from steel channel.
- I. Route exposed raceway parallel and perpendicular to walls.
- J. Route raceway installed above accessible ceilings parallel and perpendicular to walls.
- K. Maintain clearance between raceway and piping for maintenance purposes.
- L. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.
- M. Cut conduit square using saw or pipecutter; de-burr cut ends.
- N. Bring conduit to shoulder of fittings; fasten securely.
- O. Install conduit hubs to fasten conduit to cast boxes.
- P. Install no more than equivalent of four 90 degree bends between conduit bodies and boxes. Install conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate or install factory elbows for bends in metal conduit 2 inch trade size and larger.
- Q. Install fittings to accommodate expansion and deflection where raceway crosses seismic, control and expansion joints.
- R. Install suitable pull string or cord in each empty raceway except sleeves and nipples.
- S. Install suitable caps to protect installed conduit against entrance of dirt and moisture.
- T. Close ends and unused openings in wireway.

3.05 INSTALLATION – BOXES

- A. Install boxes used for equipment and luminaire attachment directly to structure or to supports provided under Section 26 00 10 "General Electrical Requirements". Do not use supports for non-electrical equipment or systems for electrical system attachment.
- B. Install wall mounted boxes at elevations to accommodate mounting heights specified in section for outlet device. Use 4-inch square boxes for receptacles.
- C. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.
- D. Orient boxes to accommodate wiring device orientation.
- E. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- F. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- G. Locate flush mounting box in masonry wall to require cutting of masonry unit corner

only. Coordinate masonry cutting to achieve neat opening.

- H. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation in non-acoustical rated walls.
- I. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- J. Install stamped steel bridges to fasten flush mounting outlet box between studs.
- K. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- L. Install adjustable steel channel fasteners for hung ceiling outlet box.
- M. Do not fasten boxes to ceiling support wires or other piping systems.
- N. Support boxes independently of conduit.
- O. Install gang box where more than one device is mounted together. Do not use sectional box.
- P. Install gang box with plaster ring for single device outlets.
- Q. Install a minimum of one 1 inch conduit for every four data and voice outlets.

3.06 FLUSH MOUNTING

- A. Unless approved by the Engineer, all electrical outlet boxes installed in finished areas shall be flush mounted. Provide cutting and patching as required. Except for approved surface mounted boxes or boxes above accessible ceilings, all boxes shall have front edge (box or plaster ring) even with the finished surface of the wall or ceiling.
- B. All materials, installations, and work within the ceiling shall comply with Codes in regards to plenum space requirements.
- C. Except for surface mounted boxes or boxes above accessible ceilings, all boxes shall have front edge (box or plaster ring) even with the finished surface of the wall or ceiling.
- D. Flush mounted boxes on opposite sides of a common wall shall not be mounted back-to-back. Provide 0'-6" minimum horizontal separation between closest edges of the boxes. Provide 24" minimum horizontal separation between outlet boxes on fire rated walls.

3.07 CONNECTION TO EQUIPMENT

- A. Provide complete connection to equipment in operable conditions. Provide outlet boxes of sizes and at locations necessary to serve such equipment. Outlet box required if equipment has pigtail wires for external connection, does not have space to accommodate circuit wiring or requires a wire with insulation rating different from circuit wiring used. Study equipment details to assure proper coordination, and connection per codes.

3.08 BLANK COVERS

- A. Provide blank covers or plates over all boxes.

3.09 JUNCTION OR PULL BOXES

- A. Pull and junction boxes shall be installed as shown, or provided as necessary to facilitate pulling of wire and to limit the number of bends within code requirements.

Boxes shall be permanently accessible and shall be placed only at locations approved by the Engineer.

- B. In suspended ceiling spaces shall be supported from structure independently from ceiling suspension system.
- C. The drawings do not necessarily show every pull or junction box required. The Contractor shall add and provide all boxes as required per code.

3.10 ADJUSTING

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closures in unused openings in boxes.
- C. Coordinate with equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

3.11 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other foreign materials.
- B. Clean exposed surfaces and restore final finish.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Underground warning tape.
- F. Warning signs and labels.
- G. Field-painted identification of conduit.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Provide catalog data for nameplates, labels, and markers.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation and installation of product.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

PART 2 - PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
- B. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
 - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
- C. Buried Electrical Lines: Underground warning tapes.
- D. Conduit: Conduit markers.
- E. Electrical Distribution and Control Equipment Enclosures: Nameplates.
- F. Junction Box Load Connections: Wire markers.
- G. Panel Gutter Load Connections: Wire markers.
- H. Pull Box Load Connections: Wire markers.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Manufacturers:
 - 1. Brady Corporation.
 - 2. Seton Identification Products
- B. Nameplates:
 - 1. Engraved three-layer laminated plastic.
- C. Colors:
 - 1. Normal Power Systems: White letters on Black background.
- D. Letter Size:
 - 1. Use 1/4 inch (6 mm) letters.
- E. Attachment:
 - 1. 1/8" Holes for attachment to equipment with stainless steel self-drilling screws.

2.03 WIRE AND CABLE MARKERS

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.
- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise

indicated.

- E. Minimum Text Height: 1/8 inch (3 mm).
- F. Color: Black text on white background unless otherwise indicated.

D. WIRE COLOR CODING

- 1. Three Phase, 4-Wire System: 120/208-Volt.
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - d. Neutral: White.
- 2. Three Phase, 4-Wire System 277/480-Volt.
 - a. Phase A: Brown.
 - b. Phase B: Orange.
 - c. Phase C: Yellow.
 - d. Neutral: Gray.
- 3. Equipment ground wire - green.
- 4. Control wiring shall be black with identifying wire numbers at each termination.
- 5. Color-coded tape may be used in lieu of color-coded insulation for conductors #8 AWG and larger. However, when color coded tape is used, the conductor insulation shall be black only and shall be tape identified with color scheme shown above at splices, terminations and junction boxes.

2.04 VOLTAGE MARKERS

- A. Minimum Size: 0.5" x 2.25 "
- B. Legend: Voltage at area marked.
- C. Color: Black text on orange background unless otherwise indicated.
- D. Location: Furnish markers for each conduit longer than 6 feet (2 m).
- E. Spacing: 20 feet (6 m) on center.

2.05 UNDERGROUND WARNING TAPE

- A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- B. Non-detectable Type Tape: 6 inches (152 mm) wide, with minimum thickness of 4 mil (0.1 mm).
- C. Legend: Type of service, continuously repeated over full length of tape.

2.06 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
 - 1. Materials:
 - 2. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.
- C. Warning Labels:

1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.
- B. Degrease and clean surfaces to receive nameplates and labels.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 1. Surface-Mounted Equipment: Enclosure front.
 2. Flush-Mounted Equipment: Inside of equipment door.
 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 4. Elevated Equipment: Legible from the floor or working platform.
 5. Interior Components: Legible from the point of access.
 6. Conductors and Cables: Legible from the point of access.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Install underground warning tape above buried lines with one tape per trench at 3 inches (75 mm) below finished grade.

3.03 FIELD QUALITY CONTROL

- A. Identify empty conduit at each end with permanent ink marker. Indicate function and termination location of other end.

END OF SECTION

PART 1 – GENERAL

1.01 GENERAL

- A. Conform to General Conditions, Supplementary Conditions, Division 01, and Division 26.
- B. Review the Specifications and Drawings for coordination with additional requirements and information that applies to work under this Specification.

1.02 SUMMARY

- A. Section Includes:
 - 1. Straight-blade convenience, hospital-grade, isolated-ground, and tamper-resistant receptacles.
 - 2. USB charger devices.
 - 3. GFCI receptacles.
 - 4. SPD receptacles.
 - 5. Hazardous (classified) location receptacles.
 - 6. Twist-lock receptacles.
 - 7. Pendant cord-connector devices.
 - 8. Cord and plug sets.
 - 9. Toggle switches.
 - 10. Wall switch sensor light switches with dual-technology sensors.
 - 11. Wall switch sensor light switches with passive-infrared sensors.
 - 12. Wall switch sensor light switches with ultrasonic sensors.
 - 13. Digital timer light switches.
 - 14. Wall-box dimmers.
 - 15. Wall plates and gaskets.
 - 16. Floor service outlets.
 - 17. Poke-through assemblies.
 - 18. Prefabricated multioutlet assemblies.

1.03 RELATED SECTIONS

- A. Division 26 Section “Raceways and Boxes”.
- B. Division 26 Section “Grounding and Bonding”.
- C. Division 26 Section “Identification for Electrical Systems”.

1.04 REFERENCES

- A. FS W-C-596 – Connector, Electrical, Power, General Specification for; Federal Specification; Revision G, 2001.
- B. FS W-S-896 – Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Federal Specification; Revision F, 1999.
- C. NECA 1 – Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.

- D. NEMA WD 1 – General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2010).
- E. NEMA WD 6 – Wiring Device – Dimensional Requirements; National Electrical Manufacturers Association; 2002 (R 2012).
- F. NFPA 70 – National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by the Authority Having Jurisdiction, including all applicable amendments and supplements.
- G. UL 20 – General-Use Snap Switches; Current Edition, including all revisions.
- H. UL 498 – Attachment Plugs and Receptacles; Current Edition, including all revisions.
- I. UL 514D – Cover Plates for Flush-Mounted Wiring Devices; Current Edition, including all revisions.
- J. UL 943 – Ground-Fault Circuit-Interruption; Current Edition, including all revisions.
- K. UL 1449 – Standard for Surge Protective Devices; Current Edition, including all revisions.
- L. UL 1472 – Solid-State Dimming Controls; Current Edition, including all revisions.
- M. UL 1917 – Solid-State Fan Speed Controls; Current Edition, including all revisions.

1.05 DEFINITIONS

- A. BAS: Building Automation System.
- B. EMI: Electromagnetic Interference.
- C. GFCI: Ground-Fault Circuit Interrupter.
- D. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- E. RFI: Radio-Frequency Interference.
- F. SPD: Surge Protective Device.
- G. UTP: Unshielded Twisted Pair.

1.06 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Submit catalog cuts for all items proposed to be furnished and installed under this Section.
- C. Product Data: For each type of product, provide manufacturer's catalog information showing dimensions, colors, and configurations.
 - 1. Wall Dimmers: Include derating information for ganged multiple devices.
 - 2. Surge Protection Receptacles: Include surge current rating, voltage protection rating (VPR), for all protection modes and diagnostics information.

- D. Shop Drawings: List of legends and description of materials and processes used for premarking wall plates.
- E. Samples: One for each type of device and wall plate specified, in each color specified.
- F. Project Record Documents: Record actual installed locations of all wiring devices.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of the Project:
 - 1. Refer to Division 01 for additional provisions.
 - 2. Floor Service-Outlet Assemblies: One for every 10, but no fewer than one.
 - 3. Poke-Through, Fire-Rated Closure Plugs: One for every five floor service outlets installed, but no fewer than one.
 - 4. Screwdrivers for Tamper-Resistant Screws: Two of each type of screw.
 - 5. Extra Keys for Locking Switches: Two of each type.
 - 6. Extra Surge Protection Receptacles: Two of each type.
 - 7. Extra GFC Protection Receptacles: Two of each type.
 - 8. Extra Wall Plates: One of each style, size, and finish.

1.07 INFORMATION SUBMITTALS

- A. Submit field quality-control reports.

1.08 CLOSEOUT SUBMITTALS

- A. Operating and Maintenance Data: For wiring devices to include in all manufacturer's packing label warnings and instruction manuals that include labeling conditions.

1.09 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer's Qualifications: Company specializing in manufacturing the products specified in this Section with minimum three (3) years documented experience.
- C. Provide products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated for all wiring devices.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space, in original manufacturer's packaging until ready for installation.

1.11 COORDINATION

- A. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other Sections or by others.
- B. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.

- C. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
- D. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
- E. Notify Owner's Representative of any conflicts or deviations from the Contract Documents to obtain direction prior to proceeding with work.
- F. Do not install wiring devices until final surface finishes and painting are complete.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Hubbell Incorporated: www.hubbell-wiring.com
- B. Leviton Manufacturing Company, Inc.: www.leviton.com
- C. Pass & Seymour, a brand of Legrand North America, Inc.: www.legrand.us
- D. Cooper Wiring Devices: www.cooperwiringdevices.com

2.02 APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather-resistant GFCI receptacles with specified weatherproof covers for all receptacles installed outdoors or in damp or wet locations.
- D. Provide GFCI receptacles for all receptacles installed within 6-feet of sinks.
- E. Provide GFCI receptacles for all receptacles installed in kitchens.
- F. Provide GFCI receptacles for all receptacles serving electric drinking fountains.
- G. Provide GFCI receptacles for all receptacles serving vending machines.
- H. Provide GFCI receptacles for all receptacles in Commercial Garages, Repair and/or Storage per Article 511 of the National Electrical Code (NEC).
- I. Unless noted otherwise, do not use combination switch/receptacle devices.

2.03 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Comply with NFPA 70.

- B. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 - 2. Devices shall comply with the requirements of this Section.
- D. Devices for Owner-Furnished Equipment:
 - 1. Receptacles: match plug configurations.
 - 2. Cord and Plug Sets: match equipment requirements.
- E. Source Limitations: Obtain each type of wiring device and associated wall plate from a single source from a single manufacturer.

2.04 APPROVED PRODUCTS

DEVICE	LEVITON	HUBBELL	COOPER
1-POLE SWITCH	CSB1-20	1221	2221
3-WAY SWITCH	CSB3-20	1223	2223
4-WAY SWITCH	CSB4-20	1224	2224
DUPLEX RECEPTACLE	5362	5362	CR5362
DUPLEX GFCI RECEPTACLE	8899	GF5362	VGf20
DUPLEX TAMPER-RESISTANT RECEPTACLE	8200SG	GFR5362TR	TR8300

2.05 WALL SWITCHES

- A. Comply with NEMA WD 1, NEMA WD 6, UL 20, and FS W-S-896.
- B. All Wall Switches: AC only, quiet operating, general-use snap switches with silver alloy contacts; types as indicated on the Drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C. Switches: 120/277 V, 20 amp rated, in the following configurations:
 - 1. Single Pole.
 - 2. Two Pole.
 - 3. Three Way.
 - 4. Four Way.
 - 5. Pilot-Light.
 - 6. Key-Operated.
 - 7. Single-Pole, Double-Throw, Momentary-Contact, Center-Off: for use with mechanically held lighting contactors.

8. Key-Operated, Single-Pole, Double-Throw, Momentary-Contact, Center-Off: for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.

2.06 STRAIGHT-BLADE RECEPTACLES

- A. All Receptacles: Self-grounding, complying with NEMA WD 1, and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the Drawings.
 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring, and with separate ground terminal screw.
 2. NEMA configurations specified are according to NEMA WD 6.
- B. Single Receptacles: Heavy duty, grounding type, complying with NEMA WD 1 and WD 6.
 1. Ratings: Match branch circuit and load characteristics.
- C. Duplex Receptacles: Heavy duty, specification grade, 20-ampere grounding type, 125 V, complying with NEMA WD 1 and WD 6, configuration 5-20R, UL 498, and FS W-C-596.
 1. One piece integral all brass mounting strap with back wired grounding terminal.
 2. Back and side wired conductor terminals.
 3. External wiring clamps with #10 large head brass screws.
 4. NEMA Configuration: 5-20R.
- D. Isolated Ground Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1 and WD 6, configuration 5-20R, UL 498, and FS W-C-596.
 1. Description: straight-blade, equipment grounding contacts shall be concealed only to the green grounding screw terminal of the device and with inherent electrical isolation from the mounting strap. Isolation shall be integral to the receptacle construction and not dependent on removable parts.
- E. Tamper-Resistant Duplex Convenience Receptacles: 25 V, 20 A; comply with NEMA WD 1 and WD 6, configuration 5-20R, UL 498, and FS W-C-596.
 1. Description: Labeled and complying with NFPA 70, "Health Care Facilities", Article "Pediatric Locations" Section.

2.07 GFCI RECEPTACLES

- A. General Description:
 1. 125 V, 20 A, straight-blade, feed-through type.
 2. Comply with NEMA WD 1 and WD 6, configuration 5-20R, UL 498, UL 943 Class A, and FS W-C-596.
 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

2.08 SPD RECEPTACLES

- A. General Description:
 1. 125 V, 20 A, straight-blade type.
 2. Comply with NEMA WD 1 and WD 6, configuration 5-20R, UL 498, UL 1449, and FS W-C-596.
 3. Integral SPD in line to ground, line to neutral, and neutral to ground.
 4. SPD Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 V and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.

5. Active SPD Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service".

B. Isolated-Ground, Duplex SPD Convenience Receptacles:

1. Grounding: Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from the mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.09 HAZARDOUS (CLASSIFIED) LOCATION RECEPTACLES

A. Comply with NEMA FB 11 and UL 1010.

2.10 TWIST-LOCKING RECEPTACLES

A. Twist-Lock, Single Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1 and WD 6, configuration L5-20R or as specified on the Drawings, and UL 498.

B. Twist-Lock, Isolated-Ground, Single Convenience Receptacles: 125 V, 20A; comply with NEMA WD 1 and WD 6, configuration L5-20R or as specified on the Drawings, and UL 498.

1. Grounding: Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from the mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.11 PENDANT CORD-CONNECTOR DEVICES

A. Description:

1. Matching, locking-type plug and receptacle body connector.
2. NEMA WD 6, configurations L5-20P and L5-20R, heavy-duty grade, and FS W-C-596.
3. Body: Nylon, with screw-open, cable-gripping jaws, and provisions for attaching external cable grip.
4. External Cable Grip: Woven, wire-mesh type, made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.12 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with the green-insulating grounding conductor, and ampacity of at least 130-percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.13 WALL SWITCH SENSOR LIGHT SWITCH, DUAL-TECHNOLOGY

- A. Description: Switchbox-mounted, combination lighting-control sensor and conventional switch lighting-control unit using dual-technology.
1. Connections:
 - a. Provisions for connection to BAS.
 - b. Hard wired.
 - c. Wireless.
 2. Rated 960 W at 120 VAC for tungsten lighting, 10 A at 120/277 VAC for fluorescent or LED lighting, and 1/4 hP at 120 VAC.
 3. Integral relay for connection to BAS.
 4. Adjustable time delay; 5, 10, 15, or 20 minutes and set at 20 minutes.
 5. Able to be locked to Automatic-On or Manual-On mode.
 6. Automatic Light-Level Sensor: Adjustable from 2 to 200 footcandles.
 7. Comply with NEMA WD 1, UL 2, and FS W-S-896.

2.14 WALL SWITCH SENSOR LIGHT SWITCH, PASSIVE-INFRARED

- A. Description: Switchbox-mounted, combination lighting-control sensor and conventional switch lighting-control unit using passive-infrared.
1. Connections:
 - a. Provisions for connection to BAS.
 - b. Hard wired.
 - c. Wireless.
 2. Rated 960 W at 120 VAC for tungsten lighting, 10 A at 120/277 VAC for fluorescent or LED lighting, and 1/4 hP at 120 VAC.
 3. Integral relay for connection to BAS.
 4. Adjustable time delay; 5, 10, 15, or 20 minutes and set at 20 minutes.
 5. Able to be locked to Automatic-On or Manual-On mode.
 6. Automatic Light-Level Sensor: Adjustable from 2 to 200 footcandles.
 7. Comply with NEMA WD 1, UL 2, and FS W-S-896.

2.15 WALL SWITCH SENSOR LIGHT SWITCH, ULTRASONIC

- A. Description: Switchbox-mounted, combination lighting-control sensor and conventional switch lighting-control unit using ultrasonic.
1. Connections:
 - a. Provisions for connection to BAS.
 - b. Hard wired.
 - c. Wireless.
 2. Rated 960 W at 120 VAC for tungsten lighting, 10 A at 120/277 VAC for fluorescent or LED lighting, and 1/4 hP at 120 VAC.
 3. Integral relay for connection to BAS.
 4. Adjustable time delay; 5, 10, 15, or 20 minutes and set at 20 minutes.
 5. Able to be locked to Automatic-On or Manual-On mode.
 6. Automatic Light-Level Sensor: Adjustable from 2 to 200 footcandles.
 7. Comply with NEMA WD 1, UL 2, and FS W-S-896.

2.16 DIGITAL TIMER LIGHT SWITCH

- A. Description: Switchbox-mounted, combination digital timer and conventional switch lighting-control unit, with backlit display, with selectable time interval in 10-minute increments.
1. Rated 960 W at 120 VAC for tungsten lighting, 10 A at 120/277 VAC for fluorescent or LED lighting, and 1/4 hP at 120 VAC.
 2. Integral relay for connection to BAS.

- A. Telephone Outlets:
 - 1. Description: Single RJ-45 jack for terminating Category 5e, twisted pair cable complying with Section 26 05 23 "Control-Voltage Electrical Power Cables" and Section 27 15 13 "Communications Copper Horizontal Cabling".
 - 2. Comply with UL 1863.
- B. Combination TV and Telephone Outlets:
 - 1. Description: Single RJ-45 jack for terminating Category 5e, twisted pair cable complying with Section 26 05 23 "Control-Voltage Electrical Power Cables" and a single BNC connector for terminating coaxial cable complying with Section 27 15 33 "Communications Coaxial Horizontal Cabling".
 - 2. Description: Single RJ-45 jack for terminating Category 5e, twisted pair cable complying with Section 27 15 13 "Communications Copper Horizontal Cabling" and a single BNC connector for terminating coaxial cable complying with Section 27 15 33 "Communications Coaxial Horizontal Cabling".
 - 3. Comply with UL 1863.

2.17 WALL-BOX DIMMERS

- A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
- B. Control: Continuously adjustable slider, with single-pole or three-way switching. Comply with UL 1472.
- C. Incandescent Lamp Dimmer Switches: 120 V; control shall follow square-law dimming curve. On-off switch positions shall bypass dimmer module.
 - 1. 600 W; dimmers shall require no derating when ganged with other devices. Illuminated when "off".
- D. Fluorescent Lamp Dimmer Switches: Modular, compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20-percent of full brightness.
- E. LED Dimmer Switches: Modular, compatible with LED drivers; trim potentiometer to adjust low-end dimming; capable of consistent dimming with low end not greater than 20-percent of full brightness.

2.18 COVER PLATES AND GASKETS

- A. All cover plates shall comply with UL 514D.
 - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 - 2. Size: Standard or as otherwise indicated.
 - 3. Screws: Metal with slotted heads finished to match wall plate finish.
- B. Single and combination types shall match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces: 0.035-inch thick, satin finished, Type 302 Stainless Steel.
 - 3. Materials for Unfinished Spaces: Galvanized Steel.
 - 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
- C. Interior Device Cover Plates:

1. 302 Stainless Steel, with laser etching marking panel name and circuit number. Refer to Section 26 05 53 "Identification for Electrical Systems" for more information.
 2. Receptacle cover plates for special use shall be pre-marked by the manufacturer:
 - a. UPS
 - b. UPS – COMPUTER
 - c. ISOLATED GROUND
 - d. GFCI PROTECTED
- D. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.
- E. Exterior Device Cover Plates: Wiring devices installed outdoors or wet areas shall be provided with hinged, gasketed, weatherproof covers.
- F. Exterior Receptacle Hinged Covers: Exterior receptacles accessible to the general public (building exterior at grade, etc.) shall be installed in flush cast aluminum outlet covers with hinged cover and keyed lock. Approved manufacturer: Pass & Seymour Catalog No. 4600.
- G. Cover Plate Gaskets: Manufacturer's standard sound-isolating and fire-protective molded neoprene complying with ASTM D 2000, formed to fit the electrical device and cover plate.
1. Basis-of-Design Product: Subject to compliance with requirements, provide STC Sound Control; STC Box Seal or comparable product by one of the following:
 - a. Trademark Soundproofing.
 - b. Or approved equal.
 2. Sound Rating: Cover plate gaskets to improve STC of recessed outlets by 7 dB or higher.
 3. Fire Rating: UL listed as Wall Opening Protective Device for use in 1-hour fire-rated walls, including back-to-back outlets.

2.19 FLOOR SERVICE FITTINGS

- A. Type: Modular, flush-type, dual-service units suitable for wiring method used.
- B. Compartments: Barrier separates power from voice and data communications cabling.
- C. Service Plates: Round, die-cast aluminum with satin finish.
- D. Power Receptacles: NEMA WD 6, configuration 5-20R, white finish unless otherwise indicated.
- E. Data Communications Outlets: Two modular, keyed, color-coded, RJ-45 jacks for twisted pair cabling complying with requirements in Section 27 15 13 "Communications Copper Horizontal Cabling".

2.20 POKE-THROUGH ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Hubbell Incorporated; Wiring Devices-Kellems.
 2. Pass & Seymour.
 3. Square D; by Schneider Electric.
 4. Wiremold/Legrand.

- B. Description:
1. Factory-fabricated and –wired assembly of below-floor junction box with multichanneled, through-floor raceway/firestop unit and detachable matching floor service-outlet assembly.
 2. Comply with UL 514 scrub water exclusion requirements.
 3. Service-Outlet Assembly: Flush type with two duplex receptacles and space for four RJ-45 jacks complying with requirements in Section 27 15 13 “Communications Copper Horizontal Cabling”.
 4. Size: Selected to fit nominal 4-inch cored holes in floor and matched to floor thickness.
 5. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
 6. Closure Plug: Arranged to close unused 4-inch cored openings and reestablish fire rating of the floor.
 7. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors with a minimum of four, four-pair cables that comply with requirements in Section 27 15 13 “Communications Copper Horizontal Cabling”.

2.21 PREFABRICATED MULTIOUTLET ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Hubbell Incorporated; Wiring Devices-Kellems.
 2. Wiremold/Legrand.
 3. Or approved equal.
- B. Description:
1. Two-piece, surface metal raceway, with factory-wired multioutlet harness.
 2. Components shall be products from a single manufacturer, designed for use as a complete, matching assembly of raceways and receptacles.
- C. Raceway Material: Metal, with manufacturer’s standard finish.
- D. Multioutlet Harness:
1. Receptacles: 20 A, 125 V, NEMA WD 6, configuration 5-20R receptacles, complying with NEMA WD 1, UL 498, and FS W-C-596.
 2. Receptacle Spacing: 9-inches on center.
 3. Wiring: No. 12 AWG solid, type THHN copper, two-circuit, connecting alternating receptacles.

2.22 FINISHES

- A. Device Color:
1. Wiring Devices Connected to Normal Power System: White, or as selected by the Architect, or as otherwise indicated.
 2. Wiring Devices Connected to Emergency Power System: Red.
 3. SPD Devices: Blue.
 4. Isolated-Ground Receptacles: Orange or with Orange triangle on face.
- B. Cover Plate Color: For plastic covers, match device color, otherwise 302 stainless steel.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Device or equipment mounting height given herein the Specifications, Drawings, and/or Contract Documents, are intended to provide general guidelines pursuant to industry standards. Such guidelines may not be exact or accurate and may or may not conflict with other trades installation without verification. Provide field coordination and verification with other divisions.
 - 1. Verify counter heights with cabinet installer and cabinet shop drawings, prior to rough-in for outlets.
 - 2. Examine other trades shop drawings to ensure that such mounting heights are appropriate for the intended device use, and the device locations do not conflict with other components. Immediately report impaired device use and conflict/location to the Owner's Representative for resolution. Devices may be moved up to 20-feet without additional compensation.
 - 3. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- B. Verify that final surface finishes are complete, including painting.
 - 1. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.
- C. The Drawings are diagrammatic and indicate generally the locations of materials, equipment, and devices. These Drawings shall be followed as closely as possible.
 - 1. Coordinate the work under this Section with the Architectural, Structural, Plumbing, Heating and Air-Conditioning, and the drawings of other trades for exact dimensions, clearances, and roughing-in locations.
 - 2. Cooperate with other trades in order to make minor field adjustments to accommodate the work of others.
 - 3. Devices and outlets can be field located by Owner's Representative within 20-feet of the designed locations prior to rough-in work, without extra compensation.

3.03 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed, unless otherwise indicated.
- B. Coordination with Other Trades:
 - 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes, and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint, unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 4. Existing conductors (where applicable):
 - a. Cut back and pigtail.
 - b. Replace all damaged conductors.
 - c. Straighten conductors that remain and remove corrosion and foreign matter.
 - d. Pigtailing existing conductors is permitted, provided the outlet box is large enough.
- D. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- E. Install wall switches with OFF position down.
- F. Install two or more wiring devices shown in one location under a common cover plate. Install cover plates with edges in continuous contact with finished wall surfaces. Do not install more than one device in a single gang position.
- G. Before installation rough-in, device locations may be revised by the Owner's Representative within 20-feet of the designed contract location, at no additional cost.
- H. Device Installation:
1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 2. Keep each wiring device in its package, or otherwise protected until it is time to connect conductors.
 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 4. Connect devices to branch circuits using pigtails that are not less than 6-inches in length.
 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3s to 3/4s of the way around the terminal screw.
 6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
 7. When conductors larger than No. 12 AWG are installed on 15- or 20-amp circuits, splice No. 12 AWG pigtails for device connections.
 8. Tighten unused terminal screws on the device(s).
 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in the yokes, allowing metal-to-metal contact.
- I. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles at the bottom, and on horizontally mounted receptacles to the right.
 2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.
- J. Device Cover Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

- K. Cover Plate Gaskets: Place gasket over exposed outlet boxes flush with wall surface with device protruding through precut opening in seal. Fit cover plate over gasket and hold in place with plate-securing screws.
- L. Dimmer Switches:
 - 1. Install dimmer switches within terms of their listing.
 - 2. Verify that dimmer switches used for fan-speed control are listed for that application.
 - 3. Install unshared neutral conductors on line and load side of dimmers according to manufacturer's device listing conditions in the written instructions.
- M. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on bottom. Group adjacent switches under single, multi-gang cover plates.
- N. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.04 GFCI RECEPTACLES

- A. Install non-feed through-type GFCI receptacles where protection of downstream receptacles are not required.

3.05 FIELD QUALITY CONTROL

- A. Perform field inspection, testing, and adjusting in accordance with Division 01.
- B. Inspect each wiring device for damage and defects.
- C. Operate each wall switch, dimmer switch, and fan speed controller with circuit energized to verify proper operation.
- D. Test each receptacle to verify operation and proper polarity.
- E. Test Instruments: Use instruments that comply with UL 1436.
- F. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital display indicators of measurement.
- G. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-amp Load: A value of 6-percent or higher is unacceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- H. Test straight-blade convenience outlets in patient-care areas for the retention force of the grounding-blade according to NFPA 99. Retention force shall not be less than 4 oz.

- I. Wiring devices will be considered defective if they do not pass tests and inspections.
- J. Correct wiring deficiencies and replace damaged or defective wiring devices.
- K. Prepare test and inspection reports.

3.06 ADJUSTING

- A. Adjust devices and cover plates to be flush and level.

3.07 IDENTIFICATION

- A. Comply with Section 26 05 53 "Identification for Electrical Systems".
- B. Identify each receptacle with panelboard and circuit number identification. Use hot, stamped, or engraved machine printing with black-filled lettering on face of cover plate, and durable wire markers or tags inside outlet boxes.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Exit signs.
- C. Drivers.
- D. LEDs.
- E. Luminaire accessories.

1.02 RELATED REQUIREMENTS

- A. Section 260537 - Boxes.
- B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 260919 - Enclosed Contactors: Lighting contactors.
- D. Section 260923 - Lighting Control Devices: Automatic controls for lighting including occupancy sensors, outdoor motion sensors, time switches, outdoor photo controls, and daylighting controls.
- E. Section 262726 - Wiring Devices: Manual wall switches and wall dimmers.
- F. Section 265600 - Exterior Lighting.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2015.
- B. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association; 2006.
- C. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; National Electrical Contractors Association; 2006.
- D. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; National Electrical Manufacturers Association; 2012.
- E. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 101 - Life Safety Code; National Fire Protection Association; 2015.
- G. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- H. UL 1598 - Luminaires; Current Edition, Including All Revisions.

- I. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
 - 2. Provide photometric calculations where luminaires are proposed for substitution upon request.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.07 WARRANTY

- A. See Section 017700 - Closeout Submittals, for additional warranty requirements.

PART 2 - PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.
 - 2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
 - 3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.
- H. LED Luminaire Components: UL 8750 recognized or listed as applicable.
- I. Track Lighting Systems: Provide track compatible with specified track heads, with all connectors, power feed fittings, dead ends, hangers and canopies as necessary to complete installation.
- J. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.03 EXIT SIGNS

- A. Description: Exit signs and similar signs for special purpose applications such as area of refuge/rescue assistance.
- B. All Exit Signs: Internally illuminated with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
 - 1. Number of Faces: Single or double as indicated or as required for the installed location.
 - 2. Directional Arrows: As indicated or as required for the installed location.

2.04 DRIVERS

- A. Dimmable LED Drivers:
 - 1. Manufacturer Limitations: Where possible, provide ballasts/drivers produced by a single manufacturer.
 - 2. Where a specific ballast/driver manufacturer or model is indicated elsewhere in the luminaire schedule or on the drawings, substitutions are not permitted unless explicitly indicated.
 - 3. Dimming Range: Continuous dimming from 100 percent to one percent relative light output unless dimming capability to lower level is indicated, without flicker.
 - 4. Control Compatibility: Fully compatible with the dimming controls to be installed.
 - a. Daylighting Controls: See Section 260923.
- B. General Requirements:
 - 1. Designed for minimum 5 year operational life while operating at maximum case temperature and 90 percent non-condensing relative humidity.
 - 2. Designed and tested to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2.
 - 3. Maximum Inrush Current: 2 amperes for 120V and 277V drivers.

4. UL 8750 recognized or listed as applicable.
5. Comply with IEC 61347-2-13 as applicable.
6. Surge Tolerance: Designed and tested to withstand surges of 4,000 V according to IEEE C62.41.2 without impairment of performance.
7. Manufactured in a facility that employs ESD reduction practices in compliance with ANSI/ESD S20.20.
8. Class A sound rating; Inaudible in a 27 dBA ambient.
9. No visible change in light output with a variation of plus or minus 10 percent line voltage input.
10. Total Harmonic Distortion (THD): Less than 20 percent; comply with ANSI C82.11.
11. Drivers to track evenly across multiple lamp lengths and all light levels.
12. Constant Current Drivers:
 - a. Support from 200 mA to 2.1 A (in 10 mA steps) to ensure a compatible driver exists.
 - b. Support LED arrays up to 40W or 50 W (710 mA to 1.05 A in 10 mA steps).
13. Constant Voltage Drivers:
 - a. Support from 10 V to 40 V (in 0.5 V steps) to ensure a compatible driver exists.
 - b. Support LED arrays up to 40W.
14. Configuration tool available to optimize the following for LED fixtures:
 - a. Light level.
 - b. Efficacy.
15. Thermal performance.

2.05 LEDS

- A. All LEDs:
 1. LED luminaires shall have LM79 and LM80 test reports.
 2. LED luminaires shall have lighting facts label.
 3. LED luminaires shall be energy star or DLC (Design Lights Consortium) rated.
 4. LED luminaires shall have a minimum CRI of 80.
 5. LED luminaires shall have minimum L70 life rating of 80,000 hours.
 6. LED luminaires shall have a minimum (5) warranty.

2.06 ACCESSORIES

- A. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.
- B. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of luminaires provided under this section.
- B. Install products according to manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).
- D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- E. Suspended Ceiling Mounted Luminaires:
 - 1. Do not use ceiling tiles to bear weight of luminaires.
 - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
 - 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
 - 4. Secure pendant-mounted luminaires to building structure.
 - 5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
 - 6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.
 - 7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- F. Recessed Luminaires:
 - 1. Install trims tight to mounting surface with no visible light leakage.
 - 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
- G. Suspended Luminaires:
 - 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
 - 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
 - 3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet in length, with no more than 4 feet (1.2 m) between supports.
 - 4. Install canopies tight to mounting surface.
 - 5. Unless otherwise indicated, support pendants from swivel hangers.
- H. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- I. Install accessories furnished with each luminaire.
- J. Bond products and metal accessories to branch circuit equipment grounding conductor.
- K. Emergency Lighting Units:

1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- L. Exit Signs:
 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
 - M. Remote Drivers: Install in accessible location as indicated or as required to complete installation, using conductors per manufacturer's recommendations not exceeding manufacturer's recommended maximum conductor length to luminaire.
 - N. All luminaires shall be provided with factory installed LEDS.
- 3.04 FIELD QUALITY CONTROL
- A. See Section 014000 - Quality Requirements, for additional requirements.
 - B. Inspect each product for damage and defects.
 - C. Operate each luminaire after installation and connection to verify proper operation.
 - D. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.
 - E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.
- 3.05 ADJUSTING
- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
 - B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.
 - C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.
- 3.06 CLEANING
- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
- 3.07 PROTECTION
- A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

PART 1 - GENERAL

1.01 SCOPE

- A. Provide complete and comprehensive cabling and termination for local area networks.

1.02 WORK INCLUDED

- A. The work includes all necessary labor, installation, preparation, materials, equipment, services, and other items required, whether specified or not, to provide a complete and fully operational local area network cabling and jack system conforming to ANSI/TIA 568-D (Parts 1 and 3) and ANSI/TIA-568-C.2 Category 6.
- B. The work requires installation of cabling, station jacks, patch cables, and patch panels, racks, cable tray, wire managers, 110 blocks, J-hooks, innerduct and other associated components.
- C. The work includes performance of diagnostic tests on all cables, connectors and components. A signed written report of all diagnostic findings shall be provided to the Owner. Using the results of the diagnostic report, the Contractor is responsible for repairing all cable, connector and component problems.
- D. The Telecommunications Contractor is to provide network cable to all intercom speakers and call switches as required. Category 6 cable to be provided, installed, terminated, and tested. Coordinate with the Communications Clock Program Systems contractor per specification section 275113.

1.03 OWNER FURNISHED EQUIPMENT

- A. All wiring switches, modules, computer equipment, file servers, workstations, network interface cards, and related hardware and software will be provided by the Owner.
- B. No other equipment furnished.

1.04 DRAWINGS AND PLANS

- A. All indicated data drop locations are to be cabled, including RJ45 jack at workstation end and termination and RJ45 jack at appropriate punch down blocks in head end rack.

1.05 PHYSICAL LAYER COMPONENTS

- A. All components shall be new and shall comply with IEEE 802.3ab Standards for 1000-Base-T Ethernet over twisted pair media and ANSI/TIA Standard 568 (use most current revision). All components shall be housed in appropriate equipment racks so as to assure a solid, permanent installation. Bidder shall identify each proposed data system component by manufacturer and part number including data cabling, fiber optic cabling, data and data/phone jacks, UTP and fiber optic station and head end patch cables, patch panels, mounting devices for termination blocks, and equipment racks.

PART 2 - PRODUCTS

2.01 MATERIAL, COMPONENTS AND EQUIPMENT

- A. All material, components, and equipment shall be new and of high quality. The components and equipment furnished must have a proven track record, and if required, the

Contractor must furnish satisfactory evidence as to the kind and quality of materials and equipment. All work to comply with ANSI/TIA Category 6 requirements. Specification is based on products by Superior Essex/Ortronics no substitutes.

- B. All telecom outlet back boxes shall be 5 square 2-7/8 inch deep. Provide T&B Steel City 82181T-1-114 or equal.

2.02 WARRANTY

- A. Installer shall be certified by the manufacturer to provide the Ortronics CIP or CIP-ESP, nCompass™ Limited Lifetime static, Dynamic and applications warranty to the end user. The end user must also receive a Limited Lifetime product warranty. Refer to www.ncompass-systems.com or www.legrand.us for additional information on the nCompass warranty. Contractor shall provide electronic media for all above listed information.

2.03 TELECOM OUTLETS

- A. ANSI/TIA 568-C Category 6 modular jacks. Provide inserts for number of data outlets shown on Drawings. Plate and outlets fog white color. Provide Ortronics OR-40300664 single gang faceplate and OR-S21600 or OR-S22600 Category 6 insert, provide yellow color icon for data and blue for voice, and label. Provide fog white blanks in unused outlets.
- B. Phone and data are same on this project.
- C. Floor box outlets shall be the same as above.
- D. T568B Type terminations.
- E. Bend radius limitations must be adhered to inside the telecom outlet box. Service loops of 1-3' should be worked into the ceiling for future use.

2.04 TELECOMMUNICATIONS HORIZONTAL CABLE

- A. ANSI/TIA 568-C, Category 6, 4-pair 23-gauge. Superior Essex DataGain white, non-plenum rated. Part Number: 66-240-4A

2.05 RACKS & CABINETS

- A. Floor Rack: Provide 19", 2-post floor rack, 7' high. Provide shelves per details. Ortronics OR-MM6E710.
- B. Power Strip Ortronics No. 60400681 provide one per rack.
- C. Ortronic cable runway (black).
- D. Horizontal Wire management Ortronics OR-808044855 for copper and OR-808044915 for fiber.
- E. Vertical Wire Management Ortronics OR-MM6VML704.
- F. Wall Mount Cabinet: Provide Great Lakes 48"H x 24"W x 32.13"D black wall mount cabinet with 30" usable depth, 25RMU, Plexiglas door, and integral fans. Cabinet part # Great Lakes GL48WD. Fan assembly part # 7217WS.

2.06 PATCH PANEL

- A. ANSI/TIA 568-C Category 6, ports as shown on Drawings, 110 on back, RJ45 on front. Ortronics #OR-PHD66U48.
- B. Patch Panels for voice backbone cabling. Ortronics #OR-PHD5E6U48.
- C. T568B Type terminations.

2.07 PATCH CABLE

- A. DATA: ORTRONICS #OR-MC6, ANSI/TIA CATEGORY 6, 4-PAIR, 23-GAUGE, LENGTHS AND COLORS AS follows:

Data-White	Telephone-Black	
3'	20	10
5'	20	10
7'	10	10
9'	10	10

2.08 COPPER BACKBONE CABLE

- A. Provide Cat 6 four pair cables, cable count as shown on drawings. Punch down on Cat 6 110 blocks.

2.09 FIBER OPTIC PATCH PANEL & CABLE

- A. Fiber Optic Backbone Cable Laser Optimized 12-Strand Multi-Mode: Superior Essex # 43012NG01
- B. Indoor/outdoor 12-Strand Multi-Mode fiber optic cable: Superior Essex # W4012NGYY.
- C. Fiber Optic Patch Cord: LC on both ends. Provide (10) 1 meter, (10) 2 meter, and (10) 3 meter patch cords. Ortronics P1DF series.
- D. Fiber Optic Patch Panel: Provide rack mounted interconnection unit with space for fibers. Provide panel adapters. All terminations in patch panels LC Type. Ortronics OR-FC02U-P with OR-OFP-LCD12LC adapter panels.
- E. Innerduct: All fiber optic cables in plastic innerduct of size required for work or as noted on Drawings.
- F. Fiber Optic Connectors; LC style connectors shall be reusable. The LC style connectors must be prepolished with low insertion loss. Ortronics # 205KNT9GA-50T

2.10 WRAPS AND SUPPORTS

- A. Provide J-hooks, B-Line#BCH64, 4" with BCHR4 retainer clip or Cablofil #CJ64. J-Hooks and cable tray are only acceptable cable supports.
- B. Tie wraps shall not be used. Provide Ortronics OR-7070084-00 Series Velcro wraps.

PART 3 - EXECUTION

3.01 EQUIPMENT MOUNTING

- A. All equipment shall be suitable mounted on fire rated terminal backboards, in equipment racks, or otherwise suitably solidly supported. Equipment suspended by its cable or

connector is unacceptable. Placing of equipment shall be done to insure that it is readily accessible.

3.02 CABLE INSTALLATION

- A. Cable run layouts indicated on the Drawings are generally diagrammatic. Exact routing of conduit and wiring shall be governed by the location of obstructions and building structural conditions. Cable runs shall be in cable trays, raceways, and above ceiling spaces as shown on Drawings.
- B. All fiber cable runs shall have a minimum 20 times the outside diameter bending radius during installation and 10 times the outside diameter post installation.
- C. All four pair copper cabling shall have a minimum bend radius of 4 times the outside diameter of the cabling.
- D. Service loops are to be determined by the site manager or the associated drawings. All copper service loops shall be in a figure 8 configuration.

3.03 CABLE SUPPORTS

- A. Cable shall be in raceway, either surface raceway, conduit, or cable tray or supported at 5' O.C. by J-hooks where open above ceilings. Wrap cable to perform a neat and professional installation. Cable wraps shall be loose to provide no strain on cables.

3.04 CABLE LABELS

- A. All cables shall be permanently labeled at workstation jack, termination block and host module port to identify terminal location and on both ends of cable. Label designation shall be a continuation of the existing labeling scheme. Example: 1-1-6 = MDF-Patch Panel One-Port 6. Example: 2-1-6 = IDF-Patch Panel One- Port 6. Consult Owner for number sequence prior to submitting shop drawings.

3.05 DATA CABLE ROUTING

- A. All shall be routed to prevent interference with any systems such as access boxed, ventilation mixing boxes, access hatches to air filters, switch panels, fire alarm equipment, lighting fixtures, etc. The routing must not interfere with any other service or system, operation or maintenance. Raceway shall not be placed in close contact with other devices, electrical or otherwise, that will interfere with its proper operation as a transmitter of data signal. The Contractor will be responsible for rerouting any raceway that is not acceptable to the Architect at no cost. Where surface raceways are used, care shall be taken to route around existing obstacles. Ceilings, wall trim shall be neatly cut to allow installation of surface raceways only as required at permission of the Owner. Cable fill rates must not exceed 75% of the maximum allowable fill to allow for future Moves, Adds and Changes. Bend radius entering and exiting the cable tray and J Hooks must be controlled to not exceed ANSI/TIA recommendations.

3.06 DATA STATION DROPS

- A. All drop cables shall be installed at locations as indicated on Drawings. Exact outlet location within each room will be as indicated on the Drawings and will deviate from the drawing only by minimal shifting the outlet laterally along the indicated wall. The drop cabling shall be installed without splices from the outlets to the appropriate terminal block.
- B. All copper and fiber cabling must be installed and terminated using the latest version of ANSI/TIA-568, ANSI/TIA-607-C, ANSI/TIA-569-D and BICSI TDMM Revision 13.

3.07 TESTING

- A. The Contractor shall test all installed unshielded twisted pair cables, termination to termination to meet ANSI/TIA Category 6 Standards and Ortonics warranty requirements including wire map, length, attenuation, return loss, near end cross talk (NEXT), delay skew, Propagation Delay, PowerSum Near End Cross Talk (PSNEXT) , Equal Level Far End Cross Talk (ELFEXT)and Power Sum equal level far end cross talk (PSELFEXT).
- B. The end user shall receive the test results via a memory stick. Test results must be delivered in original tester format and pdf with all tests resulting in a PASS. Tests resulting in a marginal pass (*PASS) or Fail will not be acceptable. The end user can also request a printed report for their records.

3.08 COMPANY QUALIFICATIONS

- A. The bidder shall be regularly engaged in the type of work specified herein. Award will be made only to a bidder who furnished satisfactory evidence that he has the technical ability, experience, equipment, personnel, and financial resources to enable him to successfully and promptly fulfill the requirements and conditions of these specifications.
- B. Bidder must have an installation base of at least 150 workstation drops using proposed products.
- C. The following Contractors are approved by K.S.D. to install the Telecommunications System:
 - 1. Cleanline Communications. Marysville, Washington.
 - 2. PowerCom. Bothell, Washington
 - 3. Teknon. Seattle, Washington.

3.09 FIBER OPTIC CABLE

- A. Terminations: All strands shall be terminated and tested. Backboard, terminals, and patch panels shall be professionally configured, including but not limited to, cable cleats, wire harnesses, support rings, etc., and should be dressed and installed to provide a planned layout of the installation.
- B. Cable: Install in inner duct and rack. Install in the Figure-8 method off the reel prior to pulling. No other practice is permitted. The maximum recommended bending radius shall not be exceeded. The maximum recommended permanent bend after installation shall not be exceeded.
- C. Pulling locations must utilize a dynamometer. Maximum tensile load shall not exceed manufacturer's recommendations. Install no LB's on Fiber Optic conduit runs.

3.10 FIBER OPTIC CABLING TESTING

- A. Test all cable and connections for continuity and repair all defects. Testing must be completed with an Optical Loss Test Set capable of testing OM3 fiber to the application required by the school district. Total loss budget for any fiber channel shall not exceed 2.6dB. Testing requirements must meet ANSI/TIA-526-14-C.
- B. O.T.D.R. tests after the LC connectors are installed will be included for all strands and fiber optic power metering testing is required while on reel. Submit all test results to Architect.
- C. Test per Ortronics and ANSI/TIA-568.D-3 testing requirements. The nCompass warranty requires bi-directional testing using both wavelengths. All testers must show a calibration within the 12 months prior to ensure accuracy. No Fail test results are allowed. The contractor must request a warranty from Ortronics shall be within 30 days of the project

completion. Ortronics will issue a Limited Lifetime Static, Dynamic and Application Assurance channel warranty to the end user thru the contractor.

END OF SECTION

CHIMACUM SCHOOL DISTRICT 49 SECURE VESTIBULE IMPROVEMENTS



JUNIOR-SENIOR HIGH SCHOOL 91 WEST VALLEY ROAD CHIMACUM, WA 98325



**CHIMACUM
SCHOOL DISTRICT**

TITLE

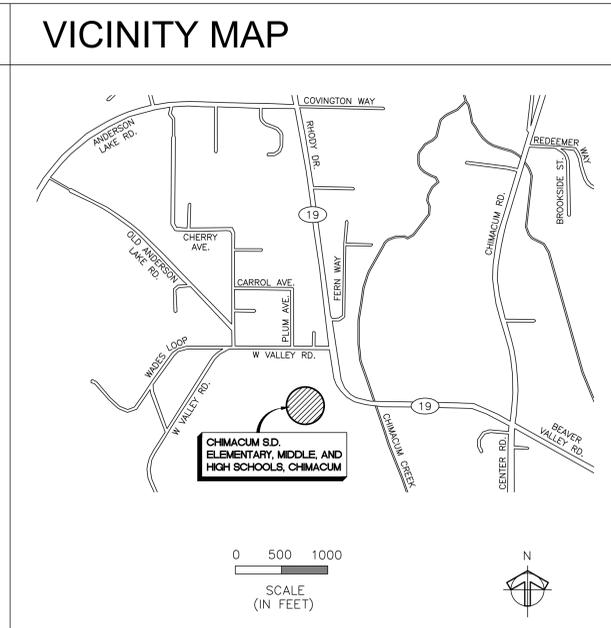
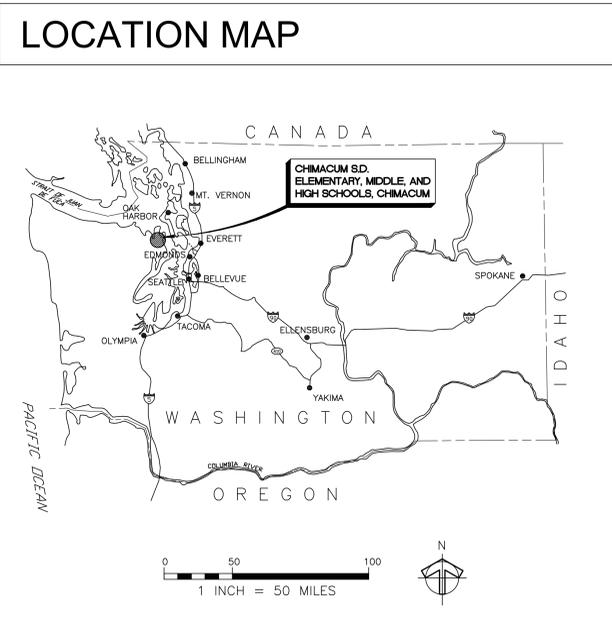
**CHIMACUM
SCHOOL DISTRICT
SECURE
VESTIBULE
IMPROVEMENT**

91 WEST VALLEY ROAD
CHIMACUM, WA 98325

STAMP



KEY PLAN



DRAWING INDEX

GENERAL	
G-101	TITLE SHEET, PROJECT INFORMATION & DRAWING INDEX
G-102	EXISTING CONDITIONS
ARCHITECTURAL	
AS-101	ARCHITECTURAL SITE PLAN
A-101	BUILDING KEY PLAN
A-105	DEMO, FLOOR, AND RCP PLANS, OPENINGS, FINISHES
A-701	INTERIOR ELEVATIONS AND DETAILS
STRUCTURAL	
S-102	BUILDING KEY PLAN
S-400	WOOD DETAILS
ELECTRICAL	
E-100	MAIN CAMPUS NORTH ELECTRICAL OVERALL PLAN
E-200	ONE-LINE DIAGRAM & PANEL SCHEDULES
E-300	PANEL SCHEDULES

PROJECT TEAM

OWNER:
CHIMACUM SCHOOL DISTRICT #49
91 WEST VALLEY ROAD
CHIMACUM, WA 98325
(360) 385-3922
ART CLARKE
HENRY FLORSCHUTZ

ARCHITECT:
STUDIO MENG STRAZZARA
2001 WESTERN AVENUE, SUITE 200
SEATTLE, WA 98121
(206) 587-3797
DENNIS ERWOOD
BRYANT DRAPER

STRUCTURAL ENGINEER:
PCS STRUCTURAL SOLUTIONS
1011 WESTERN AVENUE, SUITE 810
SEATTLE, WA 98104
(206) 292-5076

ELECTRICAL ENGINEER:
TRES WEST ENGINEERS
2702 SOUTH 42nd STREET, SUITE 301
TACOMA, WA 98409
(253) 472-3300

LEGAL DESCRIPTION

PARCEL A:
THAT PORTION OF GOVERNMENT LOT 7 AND BRIGG'S DONATION LAND CLAIM, SECTION 15, TOWNSHIP 29 NORTH, RANGE 1 WEST, W.M., JEFFERSON COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF SAID SECTION 15; THENCE SOUTH 89°14'36" WEST, ALONG THE NORTH LINE OF SAID SECTION 15, 332.48 FEET TO THE TRUE POINT OF BEGINNING OF THIS DESCRIBED TRACT; THENCE SOUTH 00°12'56" EAST, 1233.13 FEET; THENCE NORTH 74°20'38" WEST, 661.13 FEET; THENCE NORTH 60°39'13" WEST, 200.00 FEET; THENCE NORTH 25°57'06" WEST, 271.67 FEET, MORE OR LESS, TO THE CENTERLINE OF COUNTY ROAD NO. 22 (WEST VALLEY ROAD); THENCE NORTHERLY AND EASTERLY ALONG SAID CENTERLINE OF COUNTY ROAD NO. 22, 1300 FEET, MORE OR LESS, TO THE TRUE POINT OF BEGINNING.

EXCEPTING THEREFROM ANY PORTION WHICH LIES WITHIN THE WEST VALLEY ROAD, COUNTY ROAD NO. 22, AS CONVEYED TO JEFFERSON COUNTY, WASHINGTON, UNDER AUDITOR'S FILE NO. 236171, AND FURTHER EXCEPTING ANY PORTION WHICH LIES WITHIN THE CHIMACUM DRAINAGE DITCH.

SITUATE IN THE COUNTY OF JEFFERSON, STATE OF WASHINGTON.

PARCEL B:
THAT PORTION OF GOVERNMENT LOT 7 AND BRIGG'S DONATION LAND CLAIM IN SECTION 15 AND OF GOVERNMENT LOT 5 AND THE ROBINSON DONATION LAND CLAIM IN SECTION 14, ALL IN TOWNSHIP 29 NORTH, RANGE 1 WEST, W.M., JEFFERSON COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF SAID ROBINSON DONATION LAND CLAIM AND RUNNING THENCE NORTH 89°58' EAST, ALONG THE NORTH LINE THEREOF, 1239.17 FEET TO THE CENTER LINE OF CHIMACUM CREEK AND THE TRUE POINT OF BEGINNING; THENCE SOUTH 19°32' EAST, ALONG SAID CENTER LINE, 222.32 FEET; THENCE SOUTH 70°28' WEST TO A LINE WHICH IS 315 FEET SOUTH OF AND PARALLEL TO THE SAID NORTH LINE OF ROBINSON DONATION LAND CLAIM; THENCE SOUTH 89°58' WEST, ALONG SAID PARALLEL LINE TO THE WEST OF LINE OF SAID ROBINSON DONATION LAND CLAIM; THENCE CONTINUING SOUTH 89°58' WEST 100 FEET; THENCE NORTH 00°09' EAST TO THE SOUTH LINE OF GOVERNMENT LOT 7; THENCE NORTH, ALONG THE WEST LINE OF THE EAST 332.52 FEET OF SAID GOVERNMENT LOT 7, TO THE NORTH BOUNDARY OF SAID SECTION 15; THENCE EAST, ALONG SAID NORTH BOUNDARY, TO THE NORTHEAST CORNER OF SAID SECTION 15, BEING ALSO THE NORTHWEST CORNER OF SAID SECTION 14; THENCE CONTINUING EAST, ALONG THE NORTH LINE OF SAID SECTION 14, TO THE CENTER OF PORT TOWNSEND-CHIMACUM COUNTY ROAD; THENCE SOUTHERLY AND EASTERLY, ALONG SAID CENTER LINE TO THE SAID CENTER LINE OF CHIMACUM CREEK; THENCE SOUTHERLY, ALONG SAID CREEK CENTER LINE, TO THE TRUE POINT OF BEGINNING.

EXCEPT COUNTY ROAD;
ALSO EXCEPT THOSE PORTIONS CONVEYED TO JEFFERSON COUNTY BY DEEDS DATED APRIL 21, 1976 AND JUNE 12, 2014 AND RECORDED UNDER AUDITOR'S FILE NOS. 234095 AND 584836, RECORDS OF JEFFERSON COUNTY.

SITUATE IN THE COUNTY OF JEFFERSON, STATE OF WASHINGTON.

PROJECT INFORMATION

PARCEL NO.:	(INVOLVED WITH SCOPE): 901142012.
PARCEL NO.:	(WHOLE SCHOOL DISTRICT SITE): 901151013, 901142012, 901142035, 901142016, 901142026, 901151017.
PARKING:	NOT APPLICABLE (EXISTING, NO CHANGES)
SITE AREA:	47.57 ACRES
OCCUPANCY TYPES:	EDUCATION, ASSEMBLY (EXISTING, NO CHANGES)
CONSTRUCTION TYPE:	VB (EXISTING, NO CHANGES)
BUILDING AREA:	MIDDLE/HIGH SCHOOL BUILDING AT 94,291 SF TOTAL EXISTING (NO CHANGES)
APPLICABLE CODES:	2015 INTERNATIONAL BUILDING CODE 2015 INTERNATIONAL MECHANICAL CODE 2015 UNIFORM PLUMBING CODE 2015 WASHINGTON STATE ENERGY CODE

PROJECT NUMBER

2020103

ISSUED FOR: DATE:

PERMIT SET 1/8/21
BID SET 6/18/21

PLAN APPROVAL

DRAWN BY: BKD
CHECKED: DLE

SHEET CONTENTS

**TITLE SHEET
AND DRAWING
INDEX**

SHEET NUMBER

G-101

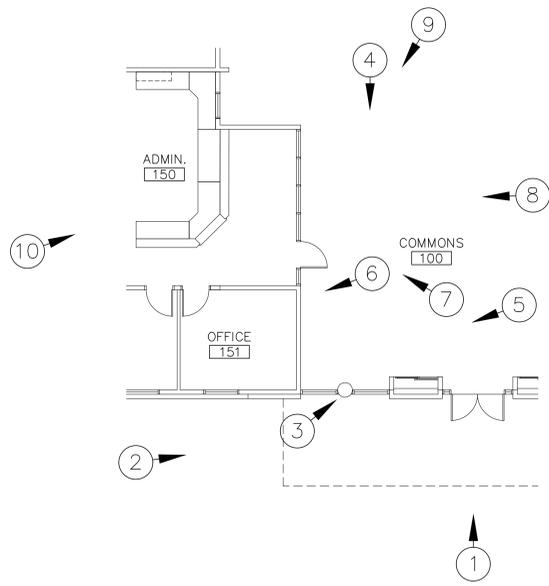


PHOTO KEY PLAN



PHOTO 1



PHOTO 2



PHOTO 3



PHOTO 4



PHOTO 5



PHOTO 6



PHOTO 7



PHOTO 8



PHOTO 9



PHOTO 10





**CHIMACUM
 SCHOOL DISTRICT**

TITLE
 CHIMACUM
 SCHOOL DISTRICT
 SECURE
 VESTIBULE
 IMPROVEMENT

91 WEST VALLEY ROAD
 CHIMACUM, WA 98325

STAMP
 6181 REGISTERED
 ARCHITECT

 CHARLES STRAZZARA
 STATE OF WASHINGTON

KEY PLAN

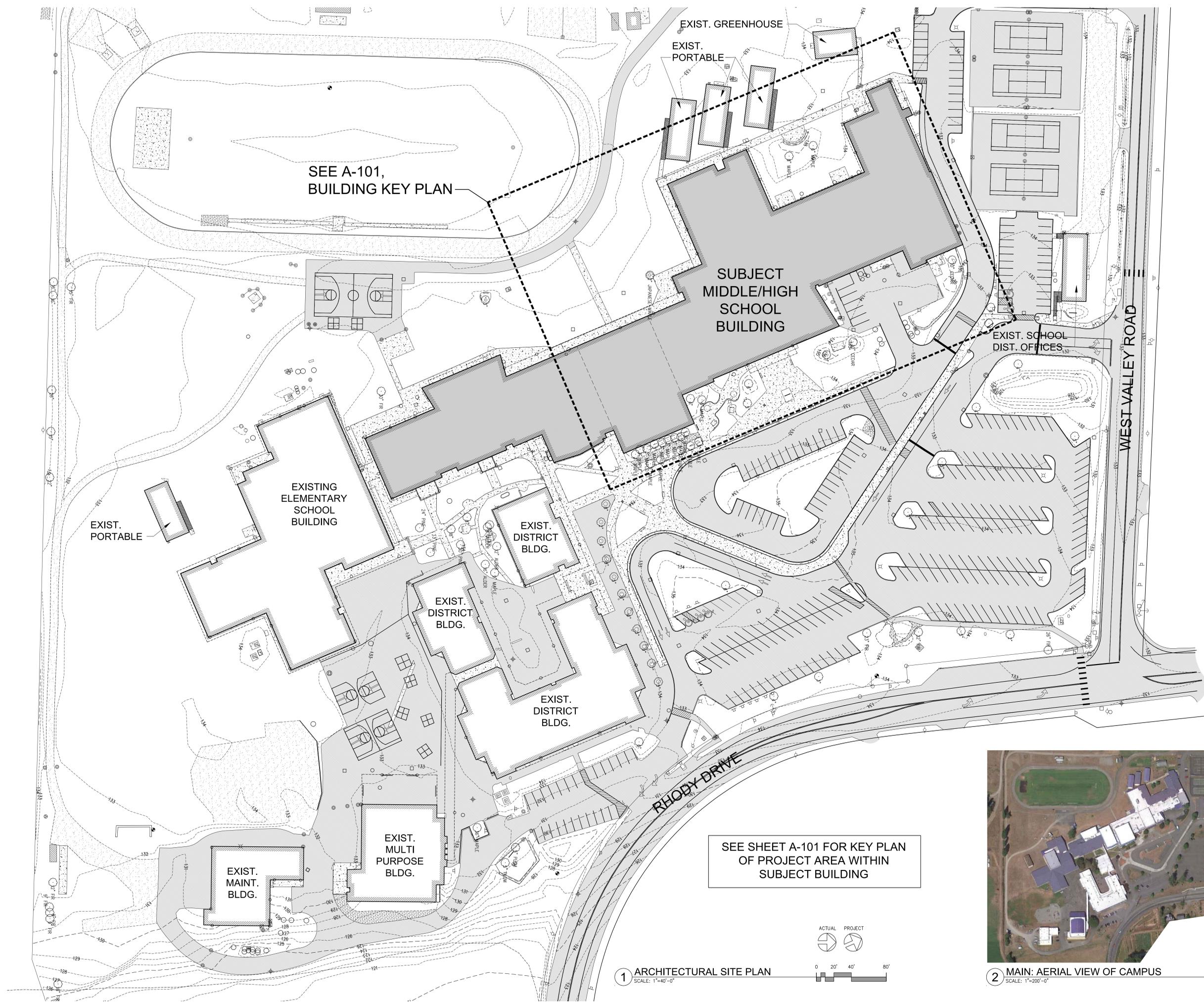
PROJECT NUMBER
2020103

ISSUED FOR: _____ DATE: _____
 PERMIT SET _____ 1/8/21
 BID SET _____ 6/18/21

PLAN APPROVAL
 DRAWN BY: BKD
 CHECKED: DLE

SHEET CONTENTS
 ARCHITECTURAL SITE
 PLAN

SHEET NUMBER
AS-101



SEE A-101,
 BUILDING KEY PLAN

SUBJECT
 MIDDLE/HIGH
 SCHOOL
 BUILDING

EXIST. SCHOOL
 DIST. OFFICES

EXISTING
 ELEMENTARY
 SCHOOL
 BUILDING

EXIST.
 PORTABLE

EXIST.
 DISTRICT
 BLDG.

EXIST.
 DISTRICT
 BLDG.

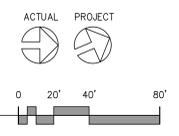
EXIST.
 DISTRICT
 BLDG.

EXIST.
 MAINT.
 BLDG.

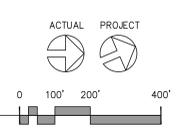
EXIST.
 MULTI
 PURPOSE
 BLDG.

SEE SHEET A-101 FOR KEY PLAN
 OF PROJECT AREA WITHIN
 SUBJECT BUILDING

1 ARCHITECTURAL SITE PLAN
 SCALE: 1"=40'-0"



2 MAIN: AERIAL VIEW OF CAMPUS
 SCALE: 1"=200'-0"





CHIMACUM
SCHOOL DISTRICT

TITLE
CHIMACUM
SCHOOL DISTRICT
SECURE
VESTIBULE
IMPROVEMENT

91 WEST VALLEY ROAD
CHIMACUM, WA 98325

STAMP



KEY PLAN

PROJECT NUMBER

2020103

ISSUED FOR: DATE:

PERMIT SET 1/8/21
BID SET 6/18/21

PLAN APPROVAL

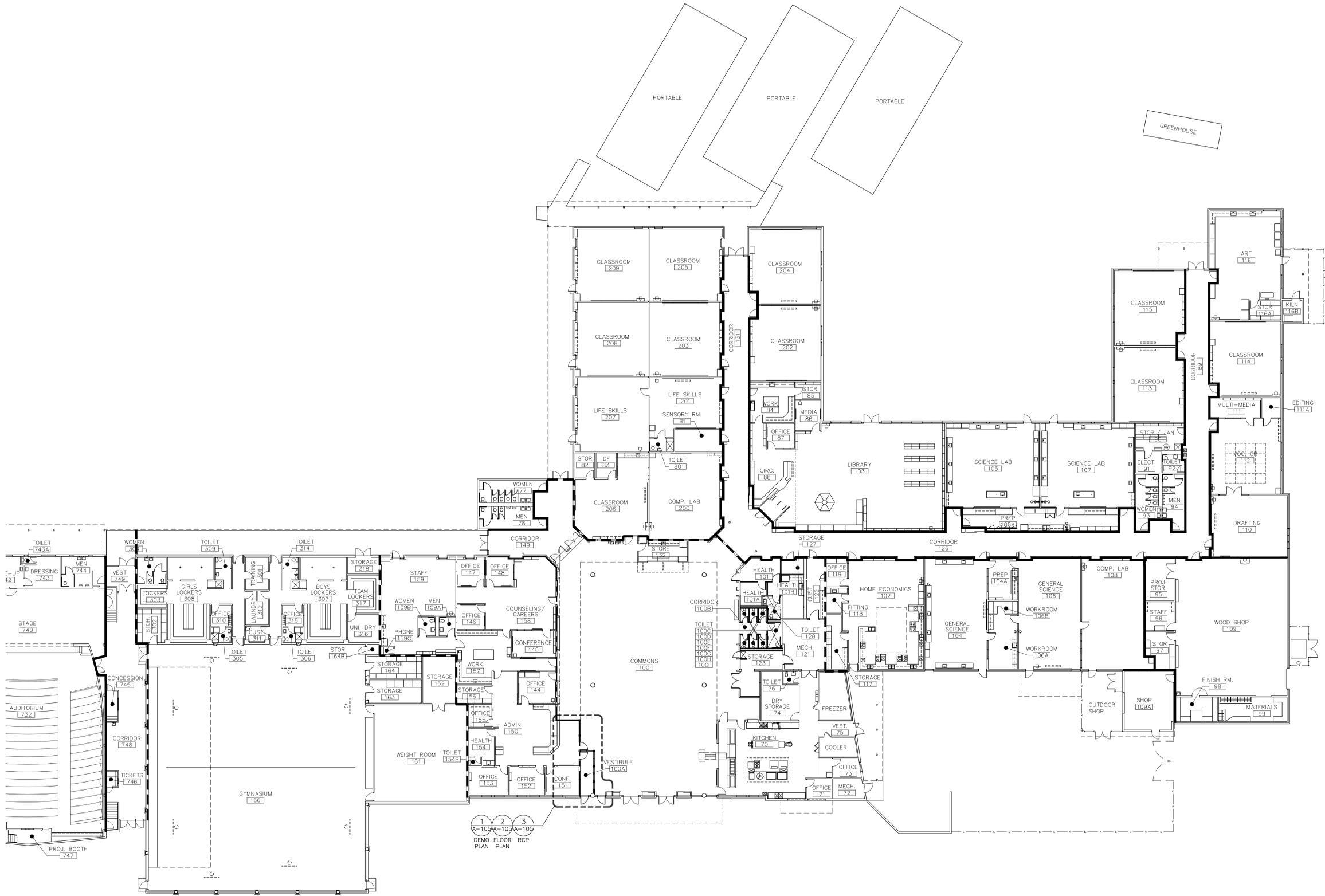
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SHEET CONTENTS

BUILDING KEY
PLAN

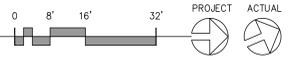
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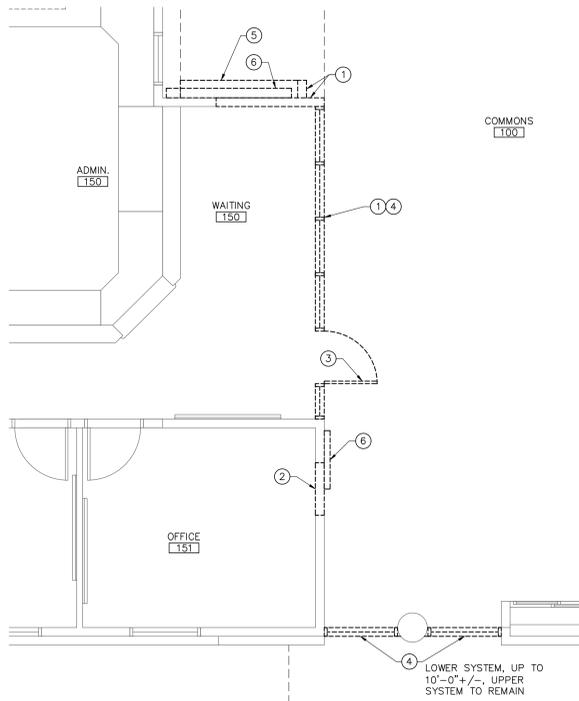
A-101



LEGEND	
	EXISTING DRAFTSTOP CONDITIONS TO BE MAINTAINED
	EXISTING 1 HOUR RATED WALL TO BE MAINTAINED
	EXISTING 2 HOUR RATED WALL TO BE MAINTAINED
	EXISTING 1 HOUR RATED CEILING/ROOF ASSEMBLY TO BE MAINTAINED

1 BUILDING KEY PLAN
SCALE: 1/16"=1'-0"





1 DEMO PLAN AT 100, 150, 151
SCALE: 1/4"=1'-0"

DEMOLITION LEGEND

- KEYNOTE TAG
- ITEMS TO BE DEMOLISHED FOR REMOVAL OR SALVAGE. SEE NOTES.

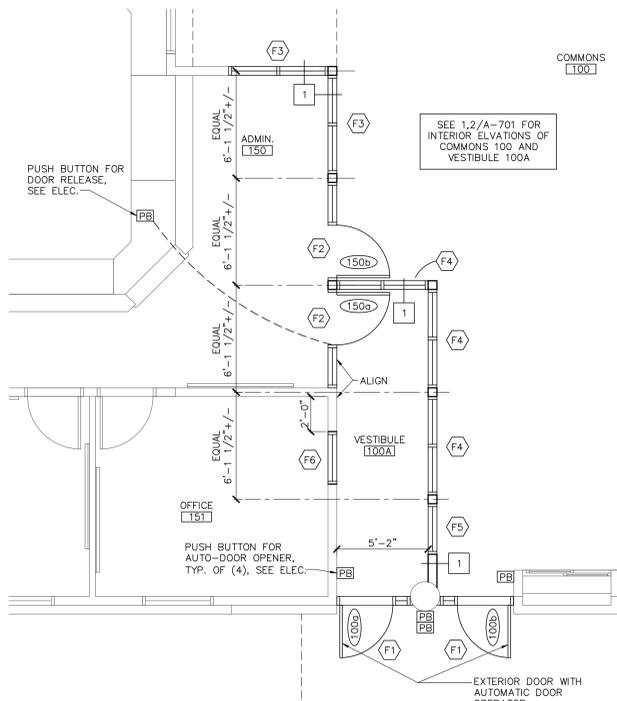
DEMO FLOOR PLAN: KEYNOTES

- DEMO AND REMOVE PARTIAL/FULL HEIGHT WALL OR PORTION THEREOF, EXTENTS AS SHOWN. ASSUME EXISTING ASSEMBLY IS WOOD STUD WITH GWB EACH SIDE.
- DEMO AND REMOVE OPENING IN EXISTING WALL AS REQUIRED TO PROVIDE FRAMING FOR NEW DOOR AND/OR WINDOW/RELITE SYSTEM. SEE PLANS FOR DIMENSIONAL REFERENCES.
- DEMO EXISTING DOOR AND FRAME SYSTEM.
- DEMO AND REMOVE WINDOW/RELITE/STOREFRONT SYSTEM.
- DEMO AND REMOVE EXISTING SOFFIT AND PATCH/PAINT ADJACENT EAST/WEST SOFFIT TO NORTH.
- DEMO AND SALVAGE DISPLAY CASE UNIT. COORDINATE RELOCATION WITH OWNER'S REPRESENTATIVE.

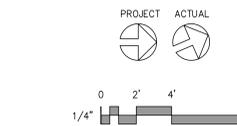
DEMO FLOOR PLAN: GENERAL NOTES

- DEMO AND REMOVE THE EXISTING GWB AT LOCATIONS TO RECEIVE A NEW WALL OR REQUIRE ACCESS FOR OTHER INSTALLATION. SEE FLOOR PLANS FOR DIMENSIONAL REFERENCES.

LOWER SYSTEM, UP TO 10'-0" +/-, UPPER SYSTEM TO REMAIN



2 FLOOR PLAN AT 100, 100A, 150, 151
SCALE: 1/4"=1'-0"

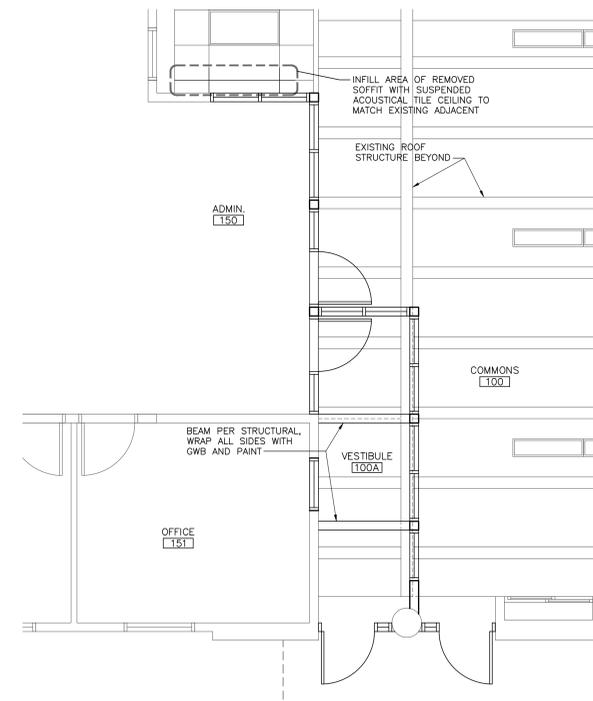


INTERIOR ASSEMBLY (SCALE 1"=1'-0")

- ACUSTICAL BATT INSULATION
- WOOD STUDS AT 16" O.C.
- 5/8" GWB
- PARTITION-2 TOTAL LAYERS GWB 2x4 WOOD STUD WALL

GENERAL ASSEMBLY NOTES:

- PROVIDE CASING BEADS AT GYPSUM WALL BOARD EDGES ABUTTING A DIFFERENT MATERIAL.
- PROVIDE SOLID BACKING FOR ALL WALL MOUNTED EQUIPMENT. VERIFY ALL MOUNTING HEIGHTS AND SPECIAL STRUCTURAL SUPPORT REQUIREMENTS WITH EQUIPMENT MANUFACTURERS BEFORE INSTALLING BACKING AND SUPPORTS.
- PROVIDE BACKING PLATES FOR ALL RAILS, CASEWORK COUNTERS, OR FIXTURES, U.N.O.
- ALL NEW GYPSUM WALL BOARD TO BE 5/8", TYPE 'X' U.N.O.
- ALL NEW PARTITIONS TO RECEIVE SOUND BATT INSULATION.

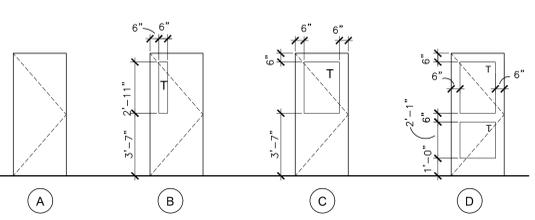


3 RCP AT 100, 100A, 150, 151
SCALE: 1/4"=1'-0"

OPENINGS

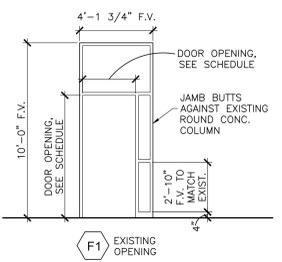
DOOR TYPES

(SEE DOOR SCHEDULE FOR OVERALL DOOR WIDTH & HEIGHT DIMENSIONS)



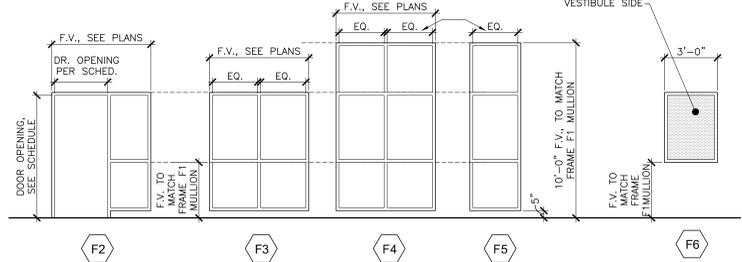
EXTERIOR FRAME TYPES

NOTE: ALL FRAME PROFILES AT 2" U.N.O.



INTERIOR FRAME TYPES

NOTE: ALL FRAME PROFILES AT 2" U.N.O.



RELITE SCHEDULE

TYPE	MAT.	FIN.	DETAILS	REMARKS
F1-F2				SEE DOOR SCHEDULE
F3	HM	PT	6B,7,8B,10/A-701	
F4	HM	PT	7,8B,9,10/A-701	
F5	HM	PT	7,9,10/A-701	
F6	HM	PT	4B,5/A-701	GLAZING TO BE ONE-WAY MIRROR. BASIS OF DESIGN: PILKINGTON MIRROPPANE.

DOOR SCHEDULE

DR.#	DOOR SIZE	TYPE	MAT.	FIN.	TYPE	MAT.	FIN.	HDW GROUP	RATING	DETAILS	REMARKS
100c	36x84	D	ALUM	FF	F1*	ALUM	FF	01	-	13,14/A-701	AUTOMATIC DOOR OPENER
100b	36x84	D	ALUM	FF	F1*	ALUM	FF	01	-	13,14/A-701	AUTOMATIC DOOR OPENER; *MIRRORED
150c	36x84	D	WD	FF	F2**	HM	PT	02	*	6A,6B,7,8A,8B,10/A-701	PUSH-BUTTON RELEASE; *DRAFTSTOP; **MIRRORED
150b	36x84	D	WD	FF	F2	HM	PT	03	*	6A,6B,7,8A,8B,10/A-701	*DRAFTSTOP

SCHEDULE ABBREVIATIONS

AG = ACOUSTIC GLAZING	L = LAMINATED	ST = STAIN
ALUM = ALUMINUM METAL	MFR = MANUFACTURER	STL = STEEL
FF = FACTORY FINISH	MP = METAL PANEL	T = TEMPERED GLASS, 1/4" (UNO)
HM = HOLLOW METAL	PR = PAIR	WD = WOOD
HS = HEAT STRENGTHENED GLASS	PT = PAINT	WG = WIRE GLASS
INSUL = INSULATED	S = SPANDREL GLASS (TEMPERED)	

GENERAL DOOR HARDWARE NOTES

- DOOR HARDWARE TO COMPLY WITH THE FOLLOWING:
- IBC 1010.1.9 - EGRESS DOORS SHALL BE READILY OPENABLE FROM THE EGRESS SIDE WITHOUT THE USE OF A KEY OR SPECIAL KNOWLEDGE OR EFFORT.
 - IBC 1010.1.9.1 - ALL DOORS ARE DESIGNED TO BE ACCESSIBLE AND AS SUCH, ALL DOOR HANDLES, PULLS, LATCHES, LOCKS AND OTHER OPERATING DEVICES ON DOORS SHALL NOT REQUIRE TIGHT GRASPING, TIGHT PINCHING OR TWISTING OF THE WRIST TO OPERATE.
 - IBC 1010.1.9.2 - ALL DOOR HANDLES, PULLS, LATCHES, LOCKS AND OTHER OPERATING DEVICES SHALL BE INSTALLED 34 INCHES MINIMUM AND 48 INCHES MAXIMUM ABOVE THE FINISHED FLOOR.
 - IBC 1010.1.9.3 - THERE SHALL BE NO LOCKS OR LATCHES DESIGNED TO PREVENT OPERATION OF DOORS FROM THE EGRESS SIDE.

FINISHES

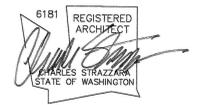
ROOM FINISH SCHEDULE

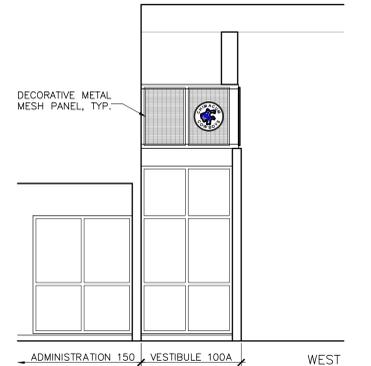
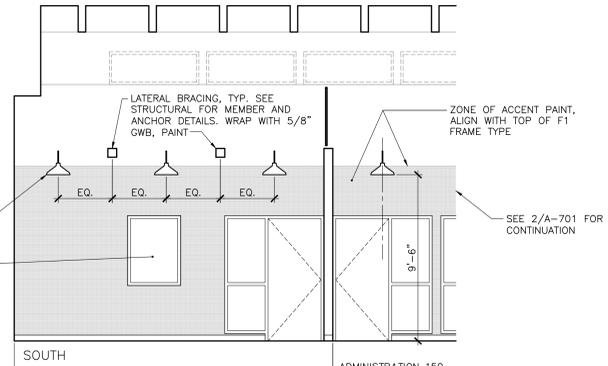
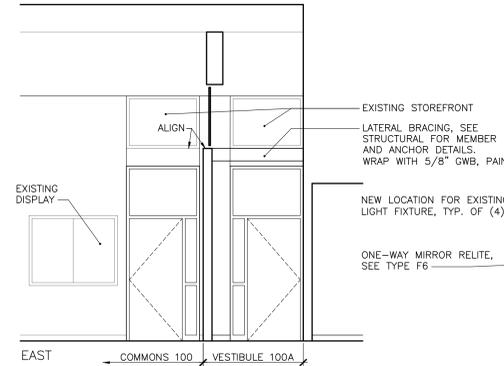
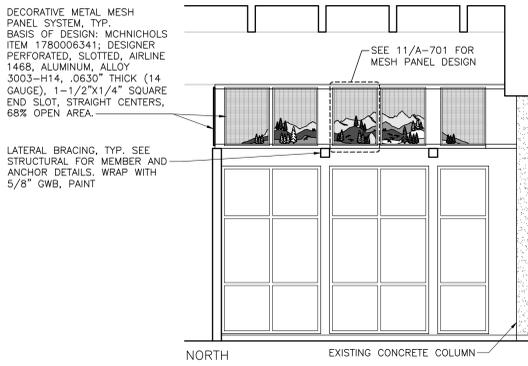
NO.	ROOM NAME	FLOOR	BASE	WALLS	CEILING	COMMENTS
100	COMMONS	(E)	RB*	PT*	(E)	*AT NEW WALLS AND TOUCH-UP OF EXISTING
100A	VESTIBULE	(E)	RB	PT	PT*	*THE GYPSUM WRAPPED LATERAL BRACING

MATERIAL SCHEDULE (BASIS OF DESIGN)

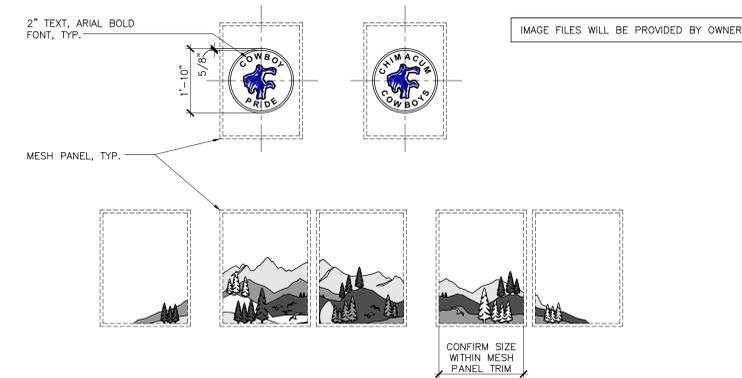
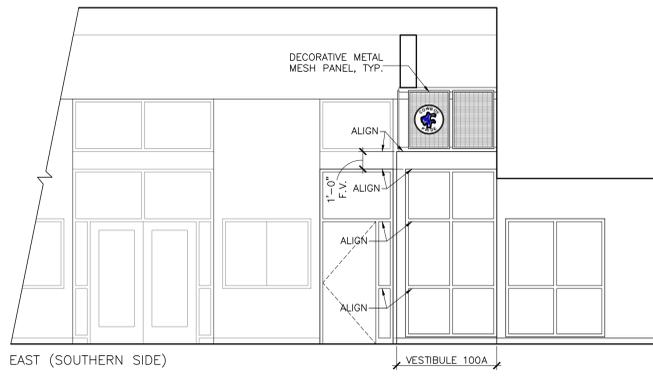
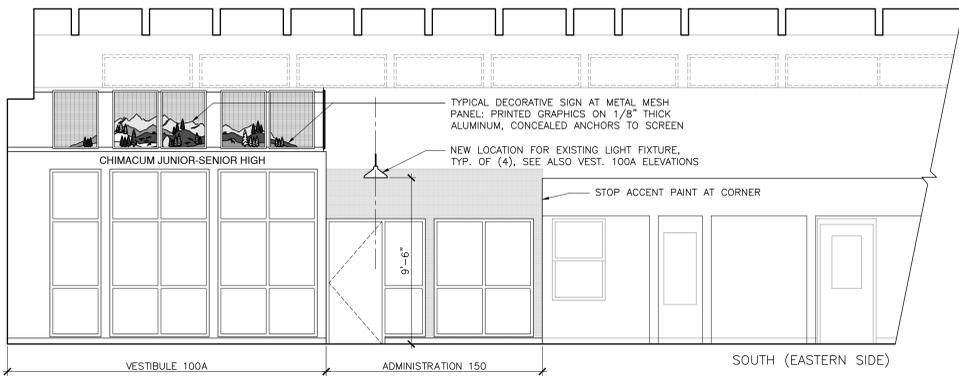
ABBR.	MATERIAL DESCRIPTION	MANUFACTURER	SIZE	STYLE	COLOR #/NAME	COMMENTS
RB	RESILIENT BASE	ROPPE	4" COVE	700 SERIES	#123, CHARCOAL	ALL RB LOCATIONS
PT-1	INTERIOR PAINT	SHERWIN WILLIAMS	-	SEE NOTE #1 BELOW	MATCH EXISTING ADJACENT WALLS	
PT-2	INTERIOR PAINT	SHERWIN WILLIAMS	-	SEE NOTE #1 BELOW	MATCH EXISTING ADJACENT FRAMES	ALL HM FRAMES

NOTE 1: COLOR/PATTERN TO BE SELECTED FROM MANUFACTURER'S STANDARD COLOR LINE.

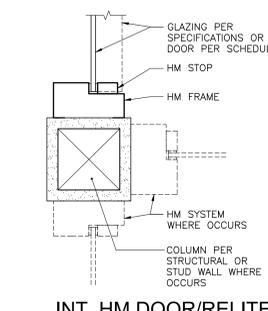
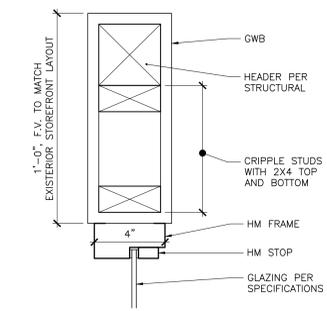
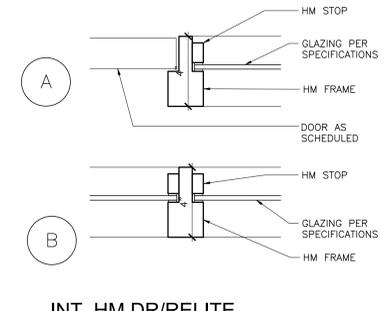
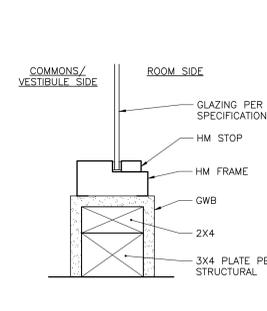
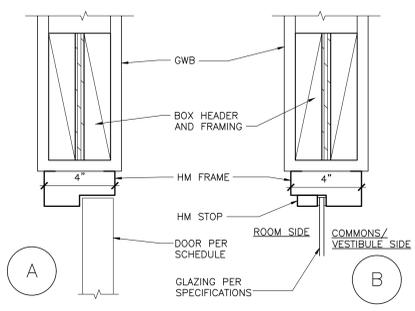
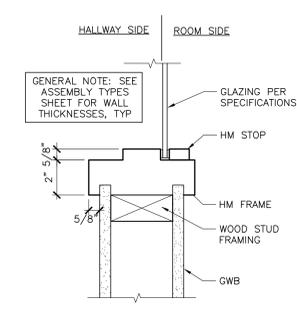
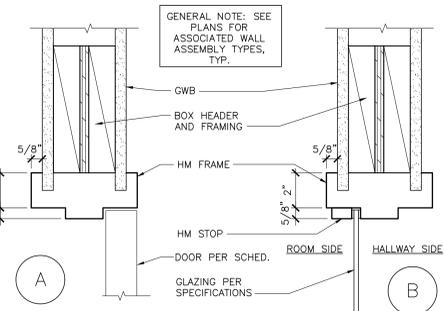




1 VESTIBULE 100A
SCALE: 1/4" = 1'-0"



2 COMMONS 100
SCALE: 1/4" = 1'-0"



4 INT. HM DOOR/RELITE HEAD (JAMB SIM.)
SCALE: 3" = 1'-0"

5 INT. RELITE SILL
SCALE: 3" = 1'-0"

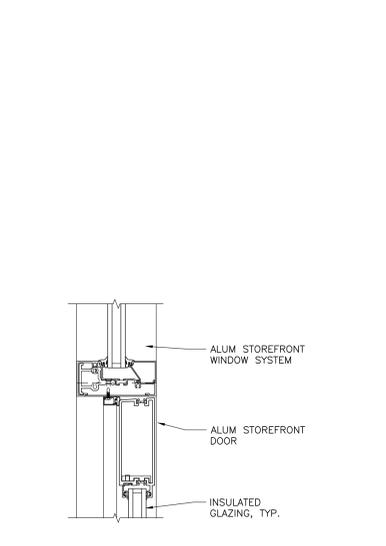
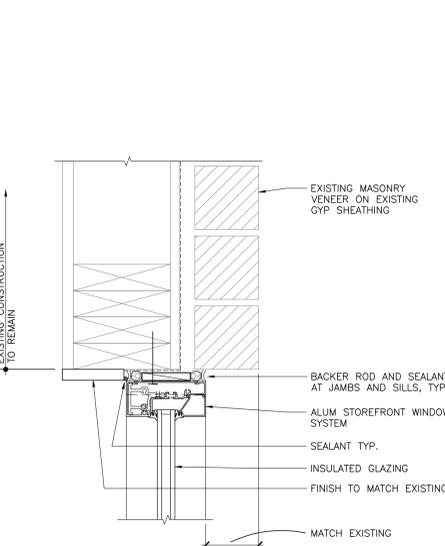
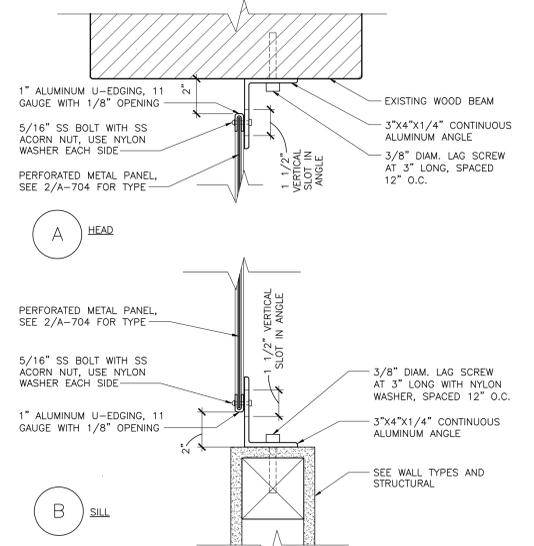
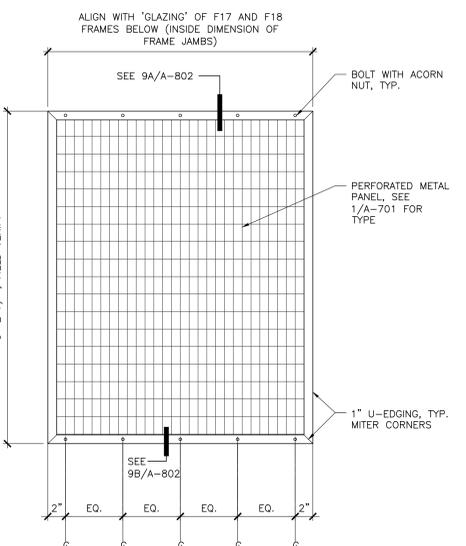
6 INT. HM DR/RELITE HEAD (JAMB SIM.)
SCALE: 3" = 1'-0"

7 INT. RELITE SILL
SCALE: 3" = 1'-0"

8 INT. HM DR/RELITE MULLION CONDITIONS
SCALE: 3" = 1'-0"

9 INT. HM RELITE HEAD
SCALE: 3" = 1'-0"

10 INT. HM DOOR/RELITE JAMB CONDITIONS
SCALE: 3" = 1'-0"



11 PERFORATED METAL PANEL ELEVATION
SCALE: 1 1/2" = 1'-0"

12 METAL PANEL SYSTEM
SCALE: 3" = 1'-0"

13 ALUM WINDOW JAMB (HEAD SIMILAR)
SCALE: 3" = 1'-0"

14 ALUM WINDOW AND DOOR JAMB (HEAD SIMILAR)
SCALE: 3" = 1'-0"



CHIMACUM SCHOOL DISTRICT
TITLE
CHIMACUM SCHOOL DISTRICT
SECURE VESTIBULE IMPROVEMENT

91 WEST VALLEY ROAD
CHIMACUM, WA 98325

STAMP
5181 REGISTERED ARCHITECT
MENG STRAZZARA
STATE OF WASHINGTON

KEY PLAN

PROJECT NUMBER
2020103

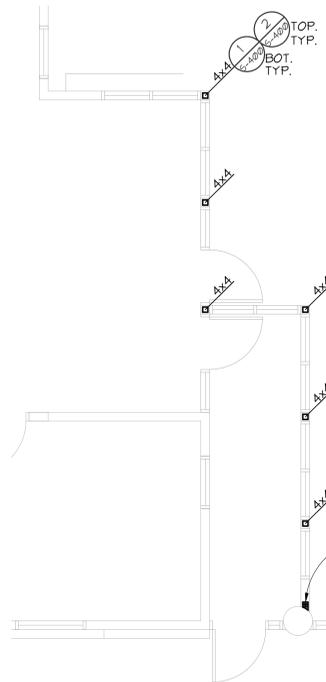
ISSUED FOR: DATE:
PERMIT SET 1/8/21
BID SET 6/18/21

PLAN APPROVAL
DRAWN BY: BKD
CHECKED: DLE

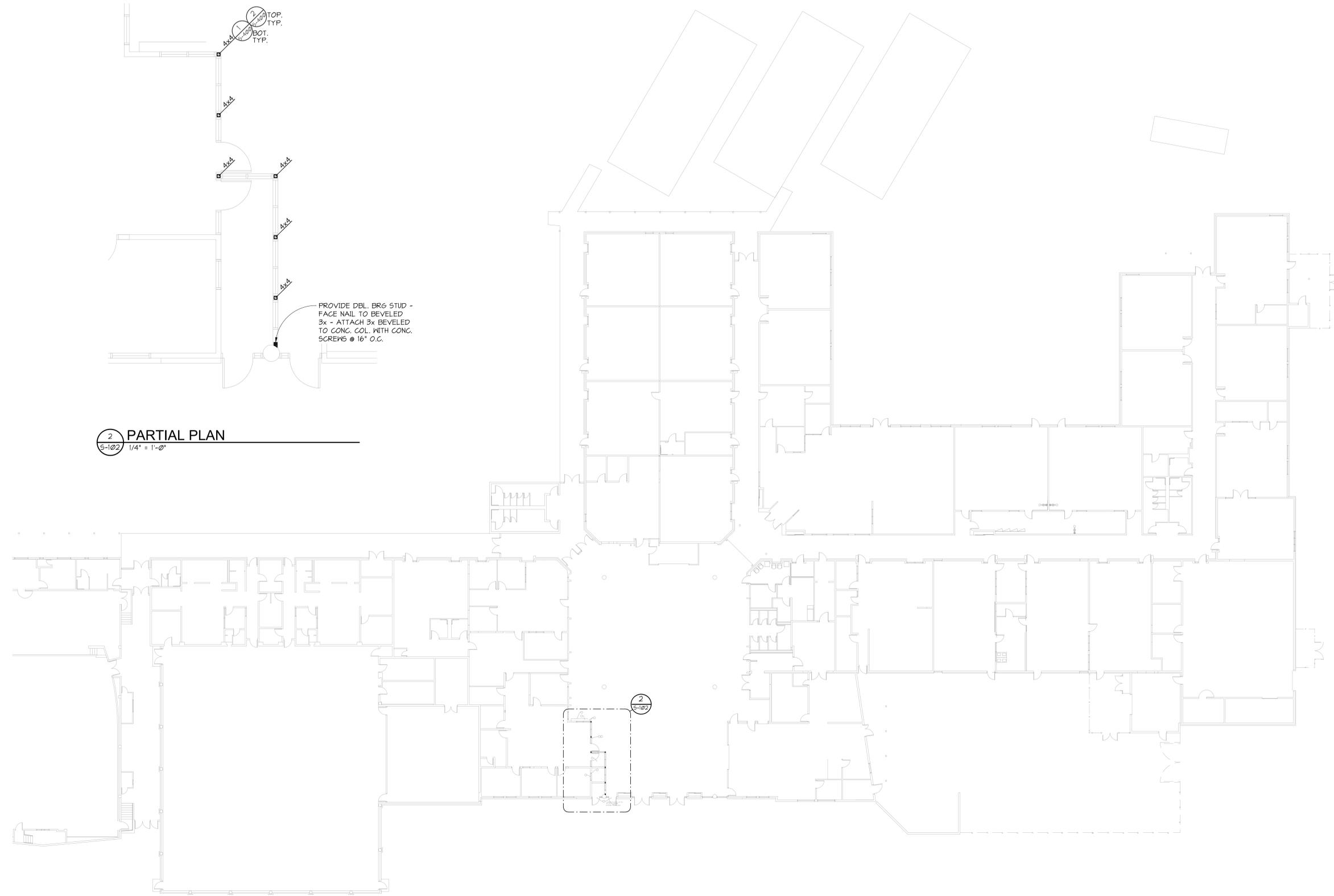
SHEET CONTENTS

INTERIOR ELEVATIONS

SHEET NUMBER
A-701

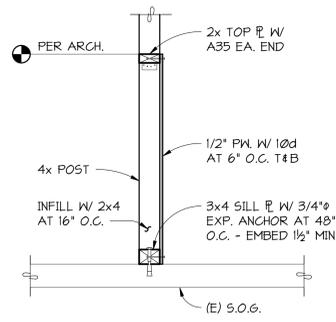


2 PARTIAL PLAN
5-102 1/4" = 1'-0"

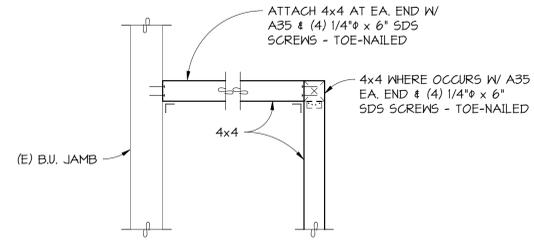


NOTE:
ALL CONSTRUCTION AND WORKMANSHIP
SHALL CONFORM TO THE 2015 IBC.

1 BUILDING KEY PLAN
5-102 1/16" = 1'-0"



1 SECTION
6-400 1" = 1'-0"



2 SECTION
6-400 1" = 1'-0"

C:_Revit Models\19398.01 CHIMACUM ENTRY VESTIBULE R2019 (CENTRAL)_dmofofpcsrvt 1/5/2021 3:32:10 PM



TITLE

CHIMACUM
SCHOOL DISTRICT

SECURE
VESTIBULE
IMPROVEMENT

91 WEST VALLEY ROAD
CHIMACUM, WA 98325

STAMP



KEY PLAN

PROJECT NUMBER

18106

ISSUED FOR: DATE:

PERMIT SET 01/08/21

BID SET 06/18/21

PERMIT

DRAWN BY: SHF

CHECKED: JC

SHEET CONTENTS

WOOD DETAILS

SHEET NUMBER

S-400

ABBREVIATIONS			
ABBRV	DESCRIPTION	ABBRV	DESCRIPTION
AFC	AVAILABLE FAULT CURRENT	MDP	MAIN DISTRIBUTION PANEL
AFF	ABOVE FINISHED FLOOR	MLO	MAIN LUGS ONLY
ATS	AUTOMATIC TRANSFER SWITCH	(N)	NEW
AL	ALUMINUM	N	NEUTRAL
BKR	BREAKER	NEC	NATIONAL ELECTRICAL CODE
C	CONDUIT	OFCI	OWNER-FURNISHED, CONTRACTOR-INSTALLED
CKT	CIRCUIT	P	PHASE POLE
CO	CONDUIT AND PULL WIRE ONLY	PNL	PANEL, PANELBOARD
COMM	COMMUNICATION	RCPT	RECEPTACLE
CTRL	CONTROL	SDP	SECONDARY DISTRIBUTION PNL
CU	COPPER	SPD	SURGE PROTECTION DEVICE
EC	ELECTRICAL CONTRACTOR	SPECS	SPECIFICATIONS
EQPT	EQUIPMENT	SW	SWITCH
(E)	EXISTING	THRU	THROUGH
(F)	FUTURE	(TYP)	TYPICAL
FACP	FIRE ALARM CONTROL PANEL	UNO	UNLESS NOTED OTHERWISE
G, GND	GROUND	W	WIRE
G.C.	GENERAL CONTRACTOR	WH	WATER HEATER
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	WP	WEATHERPROOF
GFP	GROUND FAULT PROTECTION	XFMR	TRANSFORMER
LCP	LIGHTING CONTROL CENTER		
LTG	LIGHTING		
LV	LOW-VOLTAGE		

ELECTRICAL LEGEND	
SYMBOL	DESCRIPTION
	LIGHTING OR POWER PANEL
	BRANCH CIRCUIT WIRING AND CONDUIT AS REQUIRED FOR CKTS DEVICES AND EQUIP INDICATED ON PLANS. (WIRING AND CONDUIT SIZE MAY NOT APPEAR ON PLANS). PROVIDE CONDUCTORS AND CONDUIT PER NEC CODE, #12 AWG, 34°C, MIN. EMT OR RIGID STEEL. ↓ INDICATES ISOLATED GROUND. ↓ INDICATES ISOLATED GROUND.
	CONDUIT CONCEALED IN WALL OR CEILING SPACE ONLY
	CODE SIZED JUNCTION BOX WITH COVER PLATE
	DUPLEX RECEPTACLE
	TELECOMMUNICATIONS OUTLET, SUBNUMBER=QUANTITY OF DROPS
	EMERGENCY LIGHT
	WALL MOUNTED LIGHT FIXTURE, SEE SCHEDULE FOR TYPE

SCOPE OF WORK LEGEND	
STYLE	DESCRIPTION
	EXISTING TO REMAIN
	NEW WORK
	DEMO WORK

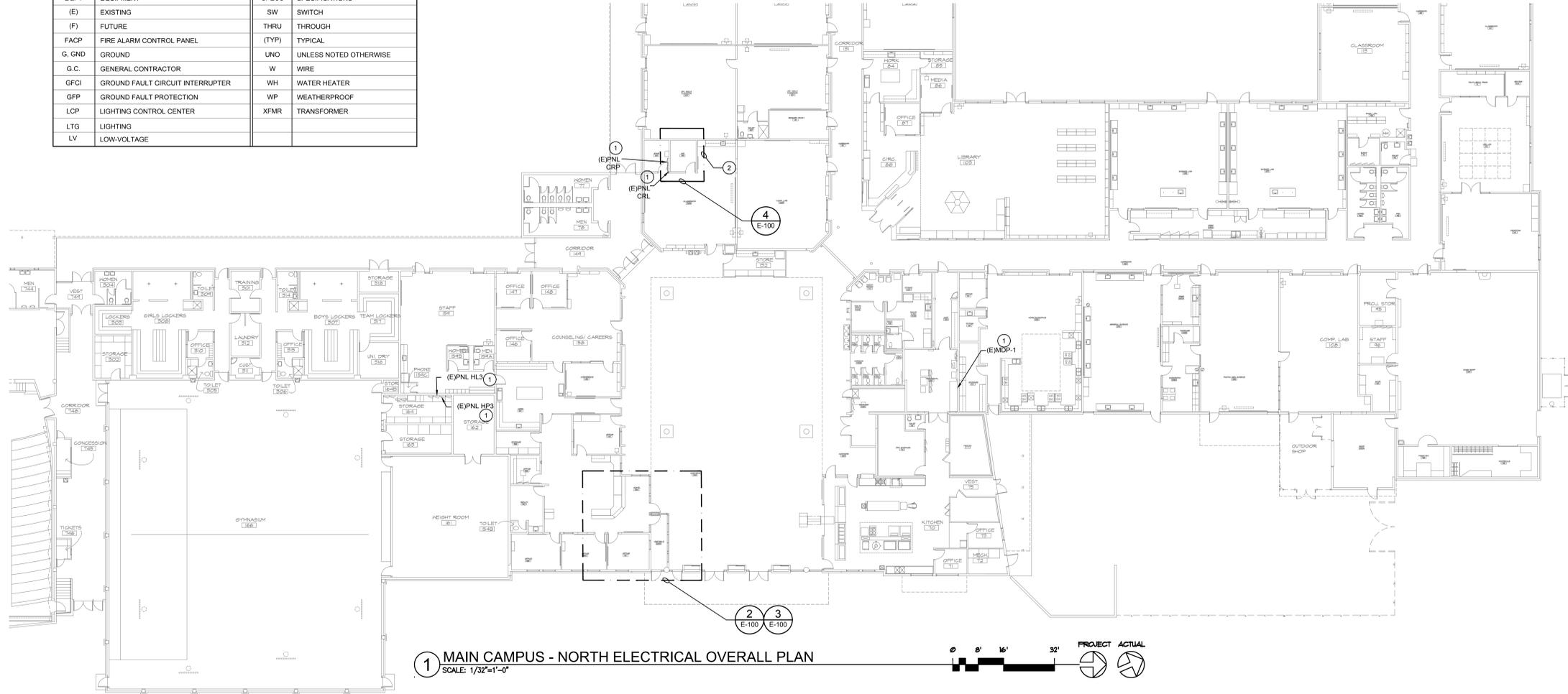
CHIMACUM SCHOOL DISTRICT SECURE VESTIBULE IMPROVEMENT - ELECTRICAL	
SHEET NO.	SHEET TITLE
E-100	MAIN CAMPUS - NORTH ELECTRICAL OVERALL PLAN
E-200	ONE-LINE DIAGRAM
E-300	PANEL SCHEDULES

GENERAL REQUIREMENTS (ALL SHEETS)

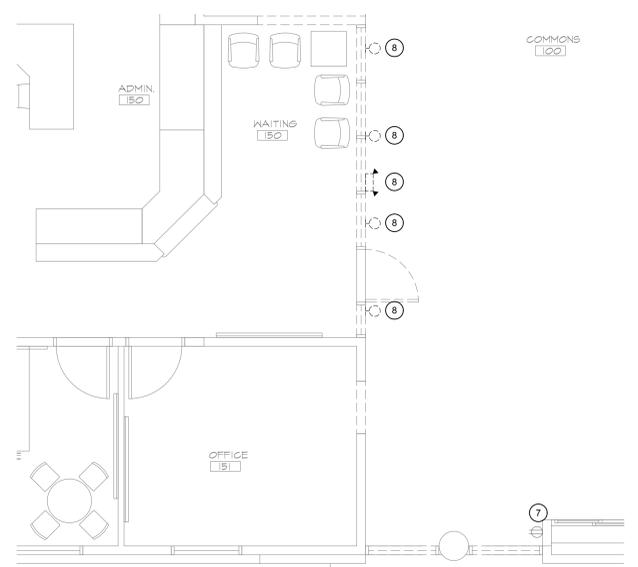
- PROVIDE COMPLETE WORK FOR REQUIREMENTS AS DESCRIBED ON LEGEND.
- PROVIDE ALL MATERIAL AND LABOR RELATED TO THE INSTALLATION OF ELECTRICAL DEVICES PENETRATING INTO OR THROUGH FIRE RATED WALLS, FLOORS, OR CEILINGS SUCH THAT THE FIRE RATING OF THE WALL IS MAINTAINED.
- DO NOT TAKE MEASUREMENTS FROM PLANS FOR DEVICE LOCATIONS. FIELD VERIFY EXACT DEVICE, EQUIPMENT LOCATIONS, AND MOUNTING HEIGHTS WITH OWNER'S REPRESENTATIVE FOR PROPER INSTALLATION.
- BRANCH CIRCUIT HOME RUNS ARE NOT INDICATED WITH NUMBER OF CONDUCTORS/WIRES. PROVIDE ALL BRANCH CIRCUIT CONDUCTORS/WIRES AS REQUIRED FOR COMPLETE OPERATION OF ALL DEVICES AND EQUIPMENT INDICATED. PROVIDE INDIVIDUAL NEUTRALS FOR EACH CIRCUIT.
- PROVIDE ALL WIRING TO PANELS AND POWER DISTRIBUTION EQUIPMENT IN ACCORDANCE WITH ONE-LINE POWER DIAGRAM.
- INCLUDE COST OF PROVIDING ALL ELECTRICAL CONNECTIONS AS REQUIRED FOR FULL OPERATION OF ALL OWNER FURNISHED, CONTRACTOR INSTALLED EQUIPMENT. SEE ARCHITECTURAL DRAWINGS TO VERIFY LOCATIONS.
- WIRING SYSTEMS SHALL BE CONCEALED WHERE POSSIBLE, EXCEPT IN ELECTRICAL ROOM, MECHANICAL ROOM, AND UTILITY AREAS, OR AS OTHERWISE NOTED.
- PROVIDE SURFACE METAL RACEWAY AS WIRING METHOD WHERE OUTLETS AND WIRING CANNOT BE CONCEALED.
- ALL ONE-LINE DIAGRAMS AND RACEWAY ROUTING ARE SCHEMATIC AND DO NOT SHOW EXACT PHYSICAL ARRANGEMENT OF EQUIPMENT ON DRAWINGS. ALL JUNCTION BOXES AND PULLBOXES SHOWN ARE MINIMUM REQUIREMENTS. PROVIDE FITTINGS AND PULLBOXES OF ADEQUATE SIZE IN RACEWAY SYSTEMS WHERE NECESSARY OR REQUIRED BY NATIONAL ELECTRICAL CODE. PROVIDE EXPANSION JOINT FITTINGS FOR RACEWAY PASSING THROUGH NEW OR EXISTING EXPANSION JOINTS INSTALLED BETWEEN BUILDINGS. VERIFY EXACT LOCATIONS AND DETAILS OF EXPANSION JOINTS PRIOR TO WORK. COORDINATE ALL RACEWAY ROUTING, PULLBOXES, AND EQUIPMENT LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS OF EQUIPMENT INSTALLATIONS. ALL EMPTY CONDUITS SHALL HAVE PULL WIRES.
- PRIOR TO PREPARATION OF BID, VISIT JOBSITE AND EXAMINE EXISTING CONDITIONS. WORK SCOPE SHALL INCLUDE ALL COSTS FOR CUTTING, PATCHING AND CORE DRILLING REQUIRED TO INSTALL CONDUIT AND OTHER WIRING METHODS THROUGH EXISTING WALLS, FLOORS AND OTHER BUILDING ELEMENTS (NOT SHOWN ON DRAWINGS).
- CONDUIT OR OTHER ELECTRICAL COMPONENTS SHALL NOT BE INSTALLED IN STRUCTURAL CONCRETE UNLESS SPECIFICALLY INDICATED ON THE DRAWINGS OR APPROVED BY STRUCTURAL ENGINEER.
- PAINT, PATCH, AND SEAL ALL PENETRATIONS TO MATCH EXISTING CONDITIONS.

PLAN NOTES

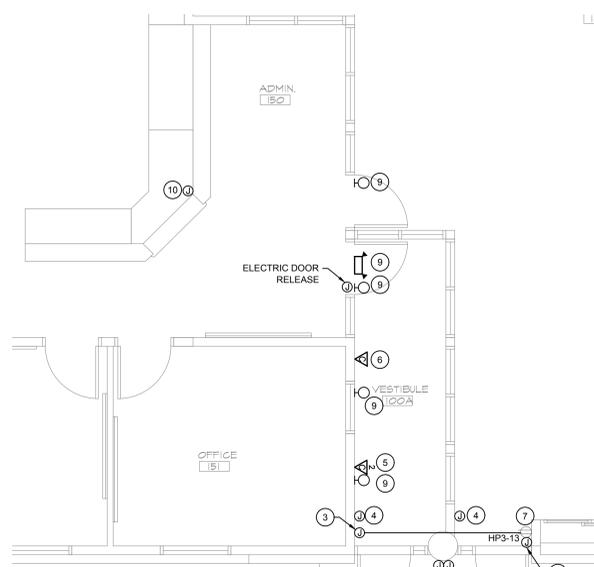
- EXISTING PANEL SHOWN FOR REFERENCE ONLY.
- LOCATION OF IDF ROOM FOR LOW VOLTAGE CABLING.
- EXTEND EXISTING CIRCUIT FROM DUPLEX RECEPTACLE TO NEW HANDICAP DOOR OPERATOR. PROVIDE CONDUIT, CONDUCTORS AND SUPPORTS FOR COMPLETE OPERATION. PAINT CONDUIT TO MATCH.
- HANDICAP PUSH BUTTON LOCATION. PROVIDE J-BOX, CONDUIT, WIRE AND ALL CONNECTIONS FOR COMPLETE OPERATION OF HANDICAP DOOR OPERATOR. COORDINATE LOCATIONS OF BUTTONS WITH ARCHITECTURAL DRAWINGS.
- PROVIDE DATA OUTLET, BACKBOX, CABLE AND SUPPORTS BACK TO TELECOM ROOM. ROUTE CABLING TO IDF ROOM 83.
- PROVIDE DATA OUTLET FOR CAMERA, BACKBOX, CABLE AND SUPPORTS BACK TO TELECOM ROOM. ROUTE CABLING TO IDF ROOM 83.
- EXISTING RECEPTACLE SHOWN FOR REFERENCE ONLY.
- EXISTING LIGHT FIXTURE TO BE DISCONNECTED, TAKEN DOWN AND RELOCATED. ALL EXISTING CONTROL WIRING, CONTROLS, CONDUIT AND CONDUCTORS TO REMAIN AND MAINTAINED.
- NEW LOCATION OF EXISTING LIGHT FIXTURE. EXTEND AND RECONNECT EXISTING CONTROL WIRING, CONDUIT AND CONDUCTORS TO NEW LOCATION. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
- PUSH BUTTON FOR ELECTRIC DOOR RELEASE HARDWARE. PROVIDE J-BOX, CONDUIT, WIRE AND ALL CONNECTIONS FOR COMPLETE OPERATION OF ELECTRIC DOOR RELEASE. COORDINATE LOCATION OF BUTTON WITH ARCHITECTURAL DRAWINGS & OWNER PRIOR TO ROUGH-IN.
- ACCESS CONTROL PANEL WITH POWER SUPPLY. COORDINATE LOCATION OF PANEL WITH OWNER PRIOR TO ROUGH-IN. PROVIDE CONDUIT, WIRE AND ALL CONNECTIONS FOR COMPLETE OPERATION OF ELECTRIC DOOR SYSTEM.



1 MAIN CAMPUS - NORTH ELECTRICAL OVERALL PLAN
SCALE: 1/32"=1'-0"



2 ELECTRICAL ENLARGED DEMO FLOOR PLAN - ROOM 100
SCALE: 1/4"=1'-0"



3 ELECTRICAL ENLARGED FLOOR PLAN - ROOM 100, 100A
SCALE: 1/4"=1'-0"



4 ELECTRICAL ENLARGED FLOOR PLAN - IDF ROOM
SCALE: 1/4"=1'-0"



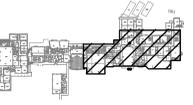
CHIMACUM SCHOOL DISTRICT

TITLE CHIMACUM SCHOOL DISTRICT SECURE VESTIBULE IMPROVEMENT

91 WEST VALLEY ROAD
CHIMACUM, WA 98325



KEY PLAN



PROJECT NUMBER 2020103

ISSUED FOR: DATE:
PERMIT SET 01/08/21
BID SET 06/18/21

PLAN APPROVAL
DRAWN BY: MLG,RBC
CHECKED: JJC

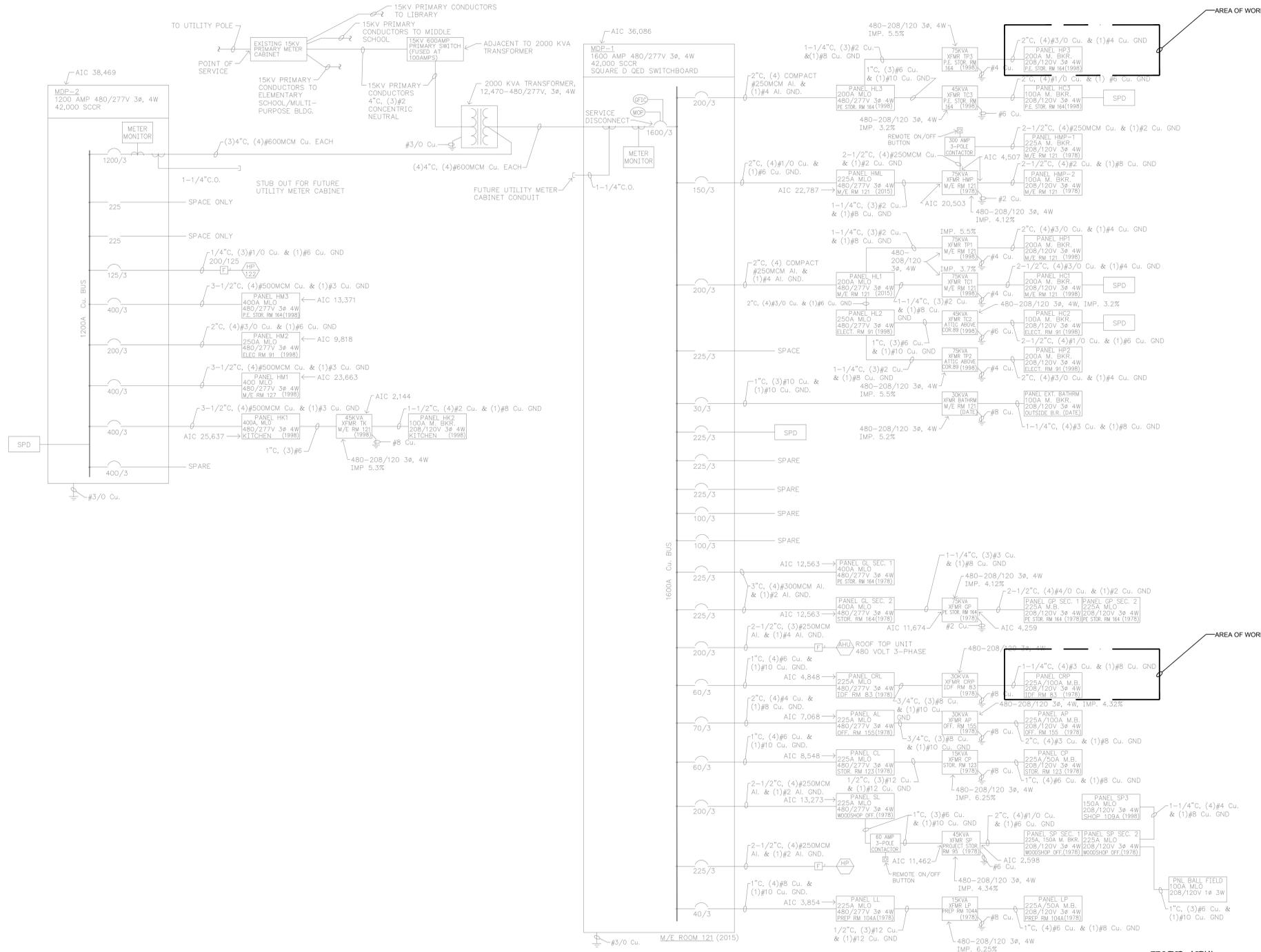
SHEET CONTENTS MAIN CAMPUS - NORTH ELECTRICAL OVERALL PLAN SHEET NUMBER

E-100

THIS DRAWING WAS PRODUCED FROM ORIGINAL AS-BUILT DRAWINGS AND FIELD OBSERVATIONS, AND MAY NOT REPRESENT AN ACCURATE AS-BUILT CONDITION. DISCREPANCIES MAY BE ENCOUNTERED, AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL CONDITIONS.

GENERAL NOTES

- ONE-LINE DIAGRAM HAS BEEN REPRODUCED FROM EXISTING DOCUMENTS AND FIELD OBSERVATIONS. AND MAY NOT FULLY PRESENT AN ACCURATE AS-BUILT CONDITION. DISCREPANCIES MAY BE ENCOUNTERED, AND IT IS THE CONTRACTORS RESPONSIBILITY TO FIELD VERIFY ALL CONDITIONS.



1 MAIN CAMPUS - HIGH SCHOOL ONE-LINE DIAGRAM
SCALE: N.T.S.



CHIMACUM SCHOOL DISTRICT

TITLE

CHIMACUM SCHOOL DISTRICT

SECURE VESTIBULE IMPROVEMENT

91 WEST VALLEY ROAD
CHIMACUM, WA 98325

STAMP



KEY PLAN

PROJECT NUMBER
2020103

ISSUED FOR: DATE:
PERMIT SET 01/08/21
BID SET 06/18/21

PLAN APPROVAL
DRAWN BY: MLG,RBC
CHECKED: JJC

SHEET CONTENTS

ONE-LINE DIAGRAM

SHEET NUMBER

E-200

EXIST PANEL	LOCATION:	480/277 VOLT	1600 AMP BUS RATING	SCCR: EXISTING						
MDP-1	SERVING:	3 PHASE	1600 AMP MAIN BREAKER							
	FED FROM: UTILITY	4 WIRE		MOUNTING: SURFACE						
CKT	LOAD DESCRIPTION	TYPE	KVA	A/P	PHASE	A/P	KVA	TYPE	LOAD DESCRIPTION	CKT
1	PANEL HL3 (NOTE 1)	P	40.095	200/3	A	225/3	175.200	D	PANEL GL SECTION 1	2
3					B					4
5					C					6
7	PANEL HML	D	96.170	150/3	A	225/3	180.650	D	PANEL GL SECTION 2	8
9					B					10
11					C					12
13	PANEL HL1	P	141.004	200/3	A	200/3	132.000	M	AHU ROOF	14
15					B					16
17					C					18
19	SPACE	S	-	-	A	60/3	38.772	P	PANEL CRL (NOTE 2)	20
21					B					22
23					C					24
25	PANEL EXT BATHRM	D	12.000	30/3	A	70/3	18.030	D	PANEL AL	26
27					B					28
29					C					30
31	SPD	D	0.000	225/3	A	60/3	33.210	P	PANEL CL	32
33					B					34
35					C					36
37	SPARE	S	-	-	A	200/3	151.851	P	PANEL SL	38
39					B					40
41					C					42
43	SPARE	S	-	-	A	225/3	149.580	D	HP ROOF	44
45					B					46
47					C					48
49	SPARE	S	-	-	A	40/3	17.040	D	PANEL LL	50
51					B					52
53					C					54
55	SPARE	S	-	-	A	-	-	S	SPACE	56
57					B	-	-	S	SPACE	58
59					C	-	-	S	SPACE	60

PHASE LOAD	PHASE A=	398.72	KVA	PHASE B=	397.93	KVA	PHASE C=	388.95	KVA	
LOAD TYPE	L	R	M	H	WH	D	A	K	LM	TOTAL LOADS
PANEL MDP-1						132.00				780.67 KVA 939.00 AMP
PANEL HL3	17.05	9.49	4.01			9.54		0.86		40.10 KVA 48.23 AMP
PANEL HL1	40.78	17.82	4.08			78.34		1.66		141.00 KVA 169.60 AMP
PANEL CL	9.46	8.40				15.35				33.21 KVA 39.95 AMP
PANEL SL	19.90	6.48	67.77			57.70		28.25		151.85 KVA 182.65 AMP
PANEL CRL	15.75	12.78	2.28			7.96		2.08		38.77 KVA 46.64 AMP
CONN. LOAD	102.94	54.97	210.13			817.56		132.00		1,185.60 KVA 1,426.06 AMP
CALC. LOAD	128.68	32.49	210.13			817.56		33.00		1,221.85 KVA 1,469.66 AMP

NOTES: 1) ADDED 220W & 550W FOR AUTOMATIC DOORS REFER TO PANEL SCHEDULE HP3.
2) ADDED 282W FOR DOOR ACCESS PANEL REFER TO PANEL SCHEDULE CRP.

EXIST PANEL	LOCATION:	480/277 VOLT	200 AMP MAIN LUGS ONLY	SCCR: EXISTING						
HL3	SERVING:	3 PHASE	200 AMP MAIN BREAKER							
	FED FROM: PANEL MDP-1	4 WIRE		MOUNTING: SURFACE						
CKT	LOAD DESCRIPTION	TYPE	KVA	A/P	PHASE	A/P	KVA	TYPE	LOAD DESCRIPTION	CKT
1	LIGHTING RM 200, 201, 206	L	3.224	20/1	A	100/3	14.242	P	PANEL HP3 (NOTE 1)	2
3	LIGHTING STAFF & COUNSEL	L	2.999	20/1	B					4
5	LIGHTING ADMNG & WORK	L	3.131	20/1	C					6
7	LIGHTING COMMON	L	1.857	20/1	A	60/3	8.800	D	PANEL HC3	8
9	LIGHTING COMMONS	L	2.766	20/1	B					10
11	LIGHTING COMMONS	L	2.766	20/1	C					12
13	LIGHTING CORRIDOR 149	L	0.310	20/1	A	20/1	-	S	SPARE	14
15	SPARE	S	-	-	B	20/1	-	S	SPARE	16
17	SPARE	S	-	-	C	20/1	-	S	SPARE	18
19	SPARE	S	-	-	A	20/1	-	S	SPARE	20
21	SPARE	S	-	-	B	20/1	-	S	SPARE	22
23	SPARE	S	-	-	C	20/1	-	S	SPARE	24
25	SPARE	S	-	-	A	20/1	-	S	SPARE	26
27	SPARE	S	-	-	B	20/1	-	S	SPARE	28
29	SPARE	S	-	-	C	20/1	-	S	SPARE	30
31	SPARE	S	-	-	A	20/1	-	S	SPARE	32
33	SPARE	S	-	-	B	20/1	-	S	SPARE	34
35	SPARE	S	-	-	C	20/1	-	S	SPARE	36
37	SPARE	S	-	-	A	-	-	S	SPACE	38
39	SPARE	S	-	-	B	-	-	S	SPACE	40
41	SPARE	S	-	-	C	-	-	S	SPACE	42

PHASE LOAD	PHASE A=	14.45	KVA	PHASE B=	13.49	KVA	PHASE C=	12.15	KVA	
LOAD TYPE	L	R	M	H	WH	D	A	K	LM	TOTAL LOADS
PANEL HL3	17.05					8.80				25.85 KVA 31.10 AMP
PANEL HP3		9.49	4.01			0.74		0.86		14.24 KVA 17.13 AMP
CONN. LOAD	17.05	9.49	4.01			9.54		0.86		40.10 KVA 48.23 AMP
CALC. LOAD	21.32	9.49	4.01			9.54		0.22		44.57 KVA 53.61 AMP

NOTES: 1) ADDED 220W & 550W FOR AUTOMATIC DOORS REFER TO PANEL SCHEDULE HP3.

EXIST PANEL	LOCATION:	208/120 VOLT	225 AMP BUS RATING	SCCR: EXISTING						
HP3	SERVING:	3 PHASE	200 AMP MAIN BREAKER							
	FED FROM: PANEL HL3	4 WIRE		MOUNTING: SURFACE						
CKT	LOAD DESCRIPTION	TYPE	KVA	A/P	PHASE	A/P	KVA	TYPE	LOAD DESCRIPTION	CKT
1	RECEPT	R	1.080	20/1	A	20/1	0.900	R	RECEPT	2
3	RECEPT	R	0.900	20/1	B	20/1	0.720	R	RECEPT	4
5	RECEPT	R	0.900	20/1	C	20/1	0.550	R	RECEPT	6
7	RECEPT	R	0.900	20/1	A	20/1	0.550	R	RECEPT	8
9	MOTORIZED DOOR	D	0.220	20/1	B	20/1	0.550	R	RECEPT	10
11	MOTORIZED DOOR	D	0.220	20/1	C	20/1	0.540	M	RECEPT ROOF	12
13	RECEPT COMMONS (NOTE 1)	R	1.870	20/1	A	20/1	0.080	M	MECH EF-119	14
15	RECEPT COMMONS	R	0.720	20/1	B	20/1	0.864	M	MECH EF-116	16
17	FIRE SMOKE DAMPERS	D	0.300	20/1	C	20/1	0.864	M	MECH EF-118	18
19	SPARE	S	-	-	A	20/1	0.860	M	MECH EF-107	20
21	SPARE	S	-	-	B	20/1	0.864	M	MECH EF-115	22
23	SPARE	S	-	-	C	20/1	-	S	SPARE	24
25	SPARE	S	-	-	A	20/1	-	S	SPARE	26
27	SPARE	S	-	-	B	20/1	-	S	SPARE	28
29	SPARE	S	-	-	C	-	-	S	SPACE	30
31	SPARE	S	-	-	A	-	-	S	SPACE	32
33	SPARE	S	-	-	B	-	-	S	SPACE	34
35	SPARE	S	-	-	C	-	-	S	SPACE	36
37	SPARE	S	-	-	A	-	-	S	SPACE	38
39	SPARE	S	-	-	B	-	-	S	SPACE	40
41	SPARE	S	-	-	C	-	-	S	SPACE	42

PHASE LOAD	PHASE A=	6.13	KVA	PHASE B=	4.79	KVA	PHASE C=	3.32	KVA	
LOAD TYPE	L	R	M	H	WH	D	A	K	LM	TOTAL LOADS
CONN. LOAD		9.49	4.01			0.74			0.86	14.24 KVA 39.53 AMP
CALC. LOAD		9.49	4.01			0.74		0.22		14.46 KVA 40.13 AMP

NOTES: BOLD = NEW WORK
1) ADDED 220W & 550W FOR AUTOMATIC DOORS.

EXIST PANEL	LOCATION:	480/277 VOLT	225 AMP MAIN LUGS ONLY	SCCR: EXISTING						
CRL	SERVING:	3 PHASE	100 AMP MAIN BREAKER							
	FED FROM: PANEL MDP-1	4 WIRE		MOUNTING: SURFACE						
CKT	LOAD DESCRIPTION	TYPE	KVA	A/P	PHASE	A/P	KVA	TYPE	LOAD DESCRIPTION	CKT
1	LIGHTS	L	3.300	20/1	A	20/1	1.800	L	LIGHTS	2
3	LIGHTS	L	1.650	20/1	B	20/1	1.800	L	LIGHTS	4
5	SPARE	S	-	-	C	20/1	1.800	L	LIGHTS	6
7	LIGHTS	L	1.800	20/1	A	20/1	-	S	SPARE	8
9	LIGHTS	L	1.800	20/1	B	20/1	-	S	SPARE	10
11	LIGHTS	L	1.800	20/1	C	20/1	-	S	SPARE	12
13	PANEL CRP (MA 30KVA XFMR)	P	23.022	40/3	A	-	-	S	SPACE	14
15	(NOTE 1)	-	-	-	B	-	-	S	SPACE	16
17					C	-	-	S	SPACE	18
19	SPACE	S	-	-	A	-	-	S	SPACE	20
21	SPACE	S	-	-	B	-	-	S	SPACE	22
23	SPACE	S	-	-	C	-	-	S	SPACE	24
25	SPACE	S	-	-	A	-	-	S	SPACE	26
27	SPACE	S	-	-	B	-	-	S	SPACE	28
29	SPACE	S	-	-	C	-	-	S	SPACE	30
31	SPACE	S	-	-	A	-	-	S	SPACE	32
33	SPACE	S	-	-	B	-	-	S	SPACE	34
35	SPACE	S	-	-	C	-	-	S	SPACE	36
37	SPACE	S	-	-	A	-	-	S	SPACE	38
39	SPACE	S	-	-	B	-	-	S	SPACE	40
41	SPACE	S	-	-	C	-	-	S	SPACE	42

PHASE LOAD	PHASE A=	15.18	KVA	PHASE B=	12.27	KVA	PHASE C=	11.32	KVA	
LOAD TYPE	L	R	M	H	WH	D	A	K	LM	TOTAL LOADS
PANEL CRP	15.75					7.96			2.08	15.75 KVA 18.94 AMP
PANEL CRP		12.78	2.28							23.02 KVA 27.69 AMP
CONN. LOAD	15.75	12.78	2.28			7.96		2.08		38.77 KVA 46.64 AMP
CALC. LOAD	19.69	11.39	2.28			7.96		0.52		41.84 KVA 50.33 AMP

NOTES: 1) ADDED 282W FOR DOOR ACCESS PANEL REFER TO PANEL SCHEDULE CRP.

EXIST PANEL	LOCATION:	208/120 VOLT	225 AMP BUS RATING	SCCR: EXISTING						
CRP	SERVING:	3 PHASE	100 AMP MAIN BREAKER							
	FED FROM: PANEL CRL	4 WIRE		MOUNTING: SURFACE						
CKT	LOAD DESCRIPTION	TYPE	KVA	A/P	PHASE	A/P	KVA	TYPE	LOAD DESCRIPTION	CKT
1	RECEPT	R	0.720	20/1	A	20/1	1.080	R	RECEPT	2