

PROJECT MANUAL

for

Serna Center Lobby Security Upgrade

at

5735 47th Avenue
Sacramento, California 95824

And

Central Enrollment Lobby Security Upgrade

at

5601 47th Avenue
Sacramento, California 95824

SACRAMENTO CITY UNIFIED SCHOOL DISTRICT
Sacramento, California

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NLA Project No. Y2244.00

Bid Package

April 23, 2024

PROJECT MANUAL AND SPECIFICATIONS
FOR
SACRAMENTO CITY UNIFIED SCHOOL DISTRICT

Serna Center and Central Enrollment
Lobby Security Upgrades
DSA Application No. n/a

SIGNATURE PAGE

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PROJECT MANUAL AND SPECIFICATIONS
FOR
SACRAMENTO CITY UNIFIED SCHOOL DISTRICT
SERNA CENTER

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PART 1 – GENERAL

- 1.01 SECTION INCLUDES
 - A. Provide all required demolition necessary to facilitate new construction.
 - B. Removal of designated construction.
 - C. Identification of utilities.
- 1.02 RELATED SECTIONS
 - A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
- 1.03 PROJECT RECORD DOCUMENTS
 - A. Submit under provisions of Division 0, General Requirements.
 - B. Accurately record actual utility locations, capped utilities, and subsurface obstructions.
- 1.04 REGULATORY REQUIREMENTS
 - A. Conform to all applicable codes for demolition work, safety of structure, dust control and safety of occupants.
 - B. Do not close or obstruct egress width to exits.
 - C. Do not disable or disrupt building fire safety systems without 72-hour prior written notice to and approval from Construction Manager.
 - D. Removal of all Hazardous Material must be performed in strict conformance with contract requirements as set forth in Exhibits C, D, and E, Abatement of Hazardous Materials.
- 1.05 SEQUENCING AND SCHEDULING
 - A. Sequence work in accordance with the contractor's use of the premises under the provisions of Section 00 72 00.
 - B. Schedule work under the provisions of Section 00 72 00.
 - C. Describe demolition removal procedures and schedule.
 - D. Perform all work between the hours of 7:00 a.m. and 4:00 p.m. except as required for abatement of hazardous materials and power outages. When school is in session, coordinate demolition working hours with site staff.
- 1.07 SUBMITTALS
 - A. Provide schedule indicating proposed sequence of operations for selective demolition work prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.

1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
 2. Coordinate with Owner's continuing occupation of portions of existing building.
- B. Photograph existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with the Construction Manager prior to start of work.
- 1.08 JOB CONDITIONS
- A. Occupancy: Owner will occupy portions of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in accordance with approved demolition sequence and in a manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72-hours advanced notice to Construction Manager of demolition activities that will affect adjacent occupancy.
- B. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.
1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner. However, minor variations within structure may occur by Owner's removal and salvage operations prior to start of work.
- C. Protection: Provide temporary barricades and other forms of protection to protect occupants and public from injury.
1. Provide protective measures as required to provide free and safe passage of Owner's personal and students to occupied portions of campus.
 2. Erect temporary covered passageways as required per CBC.
 3. Provide interior and exterior shoring, bracing and support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain.
 4. Protect from damage existing finish work that is to remain.
 5. Construct temporary dustproof partitions where required to separate areas of work from occupants. Refer to paragraph 3.01 B for partition construction.
 6. Provide temporary weather protection until final construction is completed.
 7. Remove all temporary protection when work is complete.
- D. Damages: Promptly repair damages caused to adjacent facilities by demolition work.
- E. Traffic: Conduct all demolition work and debris removal in a manner which minimizes interference with pedestrian and vehicle traffic.
1. Do not close, block, or otherwise obstruct streets, walks, paths of required exits, or other occupied areas without prior written permission from Construction Manager. Provide alternate routes around closure as required to provide safe passage.
- F. Flame cutting: Do not use cutting torches for removal until work area is free and clear of all flammable materials. At concealed spaces, verify condition of hidden space prior to starting work.

- G. Have present a fully charged, operational fire extinguisher during all flame cutting operations.
Utility Services: Maintain existing utilities to remain in service and protect from damage during demolition operations.
 - 1. Do not interrupt utilities serving occupied areas except with prior approval from the Construction Manager. Provide temporary services during interruptions to existing utilities.
 - 2. Maintain fire protection services during demolition operations.
- H. Environmental controls: use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with all governing regulations pertaining to environmental protection.
 - 1. Do not use water when it may create hazardous or objectionable conditions.
- I. Inspections:
 - 1. Prior to start of demolition work, make inspection, report and record defects and structural weaknesses of areas to be demolished as well as adjacent areas. If unsatisfactory conditions exist, do not commence demolition operations until appropriate determinations have been made by Construction Manager.
 - 2. As demolition work progresses, make periodic inspections of structure for adverse conditions and damage. Immediately notify Construction Manager if damage is observed and stop operations at that location until proper determinations have been made.
 - 3. Following demolition, make inspection and report any found defects, damages, or structural weaknesses to Construction Manager.
 - 4. The Construction Manager, Inspector and the Architect will accompany the Contractor on their inspections before and after demolition to confirm the physical condition of structure and improvements.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.01 PREPARATION

- A. Provide, erect, and maintain temporary barriers at required locations.
- B. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust, fumes, and noise and to permit safe separation for occupants.
 - 1. Construct temporary partitions of a minimum 4-inch studs, 5/8-inch drywall (with taped joints) on occupied side and 1/2-inch fire retardant plywood on demolition side. Fill stud cavity with sound deadening insulation.
 - 2. Provide weatherproof closure for exterior openings as required.
- C. Protect existing materials and finishes which are not to be demolished.
- D. Prevent movement of structure; provide required bracing and shoring.

- E. Mark location of utilities.
- 3.02 DEMOLITION REQUIREMENTS
 - A. Conduct demolition to minimize interference with adjacent and occupied building areas.
 - B. Cease operations immediately if structure appears to be in danger. Notify Architect. Do not resume operations until directed.
 - C. Maintain protected egress and access to the Work.
- 3.03 DEMOLITION
 - A. Disconnect, remove, cap, and identify designated utilities within demolition areas.
 - B. Demolish in an orderly and careful manner. Protect existing supporting structural members and materials.
 - C. Remove from site all items shown or noted to be demolished and dispose of at a legal dump site. Debris shall not be stockpiled on site.
 - D. Remove demolished materials from site as work progresses. Upon completion of work, leave areas in clean condition.
 - E. Remove temporary Work.
- 3.04 ROOFING DEMOLITION
 - A. Do not remove more roofing than can be re-roofed the following day.
 - B. Existing roofing may contain asbestos and if so, must be removed in strict conformance with the contract requirements for asbestos abatement.
- 3.05 RECONDITIONING EXISTING SUBSTRATES
 - A. Clean surfaces on which new materials will be installed. Remove all adhesives, bitumen, and other materials as necessary to provide an acceptable substrate for new materials.
 - B. Perform sandblasting, chipping, grinding, acid washing, etching, and other work as required by conditions encountered and new materials involved.
 - C. Use of acids or other cleaning agents shall include neutralizing, washing, rinsing, and drying, as applicable.
 - D. Determine substrate requirements for reconditioned surfaces in cooperation with the manufacturer's representative and installer of each new material involved.
 - E. Prepare existing concrete surfaces to receive new cast-in-place concrete by roughening, to the extent that the entire surface has a moderate to heavy broken or fractured texture, except for keyed joint, which require the exposure of coarse aggregate.
 - F. Inspect existing wood roof sheathing and metal decking for possible structural defects and report any found defects to Construction Manager. All Structural repairs are to be made as directed by Architect on a time and material basis under allowance provided on Proposal Form.
- 3.06 MECHANICAL PIPING DEMOLITION

- A. Existing mechanical pipe wrap may contain asbestos and if so, must be removed in strict conformance with the contract requirements for asbestos abatement.
- 3.07 CLEANUP AND REPAIR
- A. All areas of demolition must be left clean.
- END OF SECTION 02 41 00

SECTION 02 41 00

SITE DEMOLITION

PART 1 – GENERAL

1.01 SUMMARY

A. RELATED SECTIONS

1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
2. Section 01 50 00 - Construction Facilities and Temporary Controls.
3. Section 01 50 13 - Construction Waste Management and Disposal.
4. Section 32 31 19 – Site Concrete.

1.02 REGULATORY REQUIREMENTS

- A. Conform to applicable jurisdictional authority regulations and codes for disposal of debris.
- B. Coordinate clearing Work with utility companies
- C. Maintain emergency access ways at all times.
- D. Contractor shall comply with all applicable laws and ordinances regarding hazardous materials, including contaminated soils, hazardous material transformers, and similar materials or components.

1.03 SUBMITTALS:

- A. Schedule: Submit a detailed sequence of demolition and removal work, including dates for shutoff, capping, and continuance of utility services.
- B. Procedures: Submit written procedures documenting the proposed methods to be used to control dust and noise.

1.04 EXISTING CONDITIONS

- A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.
- B. Conduct demolition to minimize interference with adjacent structures or items to remain. Maintain protected egress and access at all times.

1.05 PROTECTION

- A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.
- B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.
- C. Safety Precautions Prevent damage to existing elements identified to remain or to be salvaged, and prevent injury to the public and workmen engaged on site. Demolish roofs, walls and other building elements in such manner that demolished materials fall within foundation lines of building. Do not allow demolition debris to accumulate on site. Pull down hazardous work at end of each day; do not leave standing or hanging overnight, or over weekends.
 - 1. Protect existing items which are not indicated to be altered. Protect utilities designated to remain from damage.
 - 2. Protect trees, plant growth, and features designated to remain as final landscaping as shown on drawings.
 - 3. Protect benchmarks from damage or displacement.
- D. Trees: Carefully protect existing trees that are to remain. Provide temporary irrigation as necessary to maintain health of trees.
- E. Fire Safety: The contractor shall conform to chapter 33 of the California Fire Code (CFC), "Fire Safety During Construction and Demolition", at all times during the construction process. A copy of this chapter can be provided.
- F. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.
- G. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.
- H. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.
- I. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

PART 2 - PRODUCTS

Not Used

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine conditions of work in place before beginning work, report defects.
- B. Report existence of hazardous materials or unsafe structural conditions.

3.02 PREPARATION

A. Scheduling:

- 1. General: Coordinate and schedule demolition work as required by the Owner and as necessary to facilitate construction progress.

B. Hazardous Materials:

- 1. General: Identify chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations, and notify such jurisdictional agencies as may be required. Collect and legally dispose of such materials at official disposal locations away from the site.
- 2. Asbestos: If asbestos or materials containing asbestos are encountered, stop work immediately and contact the Owner. Do not proceed with demolition until directed by Owner.

C. Utility and Service Termination

- 1. Locate and identify existing utility, service and irrigation system components affected by work of this contract. Review existing record drawings, conduct site investigations, contact Underground Service Alert and other qualified cable/pipe/line locator services, and implement all other means necessary to define the location of underground systems.
- 2. Prior to beginning any demolition, properly disconnect all water, gas and electrical power supply at appropriate disconnect locations. Obtain all necessary releases and approvals from serving utility companies.
- 3. Prior to demolition or disconnect, obtain Owner's approval that such system does not impact facilities or systems beyond the extent of this contract.
- 4. Mark location of disconnected systems. Identify and indicate stub-out locations on Project Record Documents.

D. Verify that existing plant life and features designated to remain are tagged or identified.

- 1. The Architect will mark the features, trees, and shrubs to remain within the construction area. Contractor shall not commence clearing and grubbing operations until authorized by the Owner and all protective measures are in place.

- E. Coordinate the time and duration of all system disconnects with Owner.

3.03 DEMOLITION

A. General Requirements

1. Clear areas required for access to site and execution of Work, including pavements, structures, foundations, vegetation, trash and debris.
2. Coordinate with Owner the time of day and route to remove demolished materials from premises.
3. Remove demolished materials from site as work progresses. Upon completion of work, leave areas of work in clean condition.
4. Remove all buried debris, rubble, trash, or other material not deemed suitable by the Geotechnical Engineer.
5. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with specified fill material.

B. Fixture and Equipment Removal:

1. Remove existing fixtures and equipment as identified and shown on drawings and required by Architect.
2. Verify all service connections to fixtures and equipment designated for removal have been properly disconnected.
3. Remove all conductors from conduit at all abandoned circuits.

3.04 UTILITY AND BUILDING SERVICES REMOVAL AND RE-INSTALLATION

- A. Where crossing paths and potential points of interference with existing utility services are shown or can be reasonably inferred from surface conditions or evidence of subsurface systems, such as meter boxes, vaults, relief vents, cleanouts and similar components.
 1. Review all contract documents showing crossing paths and potential points of interference.
 2. Pothole or determine by other means the accurate depth and location of such utilities.
 3. Incorporate all costs required to complete work under this contract, including additional trenching, re-routing of existing and new utilities, and all means necessary to construct work under this contract.
 4. No additional cost to the Owner will be allowed for work necessary to accommodate utility conflicts where such crossing paths are shown on contract drawings or can be reasonably inferred from surface conditions or components.
- B. Remove all conductors from conduit at all abandoned electrical circuits.
- C. Seal off ends of all piping, drains and other components as directed by Architect and serving utility.
- D. Where necessary to maintain service to existing utility and building systems, relocate or redirect all conduit and conductors, piping, drains, and associated system components.
 1. Re-circuit all electrical as required.

2. Re-circuit all landscape irrigation valving and control systems as required.
3. Temporarily terminate landscape system components in approved boxes or with approved caps, suitable for re-connection or extension.
4. Extend or otherwise modify all site drainage systems, including catch basins, drain inlets and piping. Fine grade to maintain proper drainage flow pattern to drains.

E. Demolish structure in an orderly and careful manner.

1. Use of explosives prohibited.

3.05 SITE PAVEMENT REMOVAL

A. Remove sidewalk and curb where required for new construction as specified and as indicated on the Drawings.

1. Remove all paving by saw-cutting.
2. Remove concrete paving and curbing at locations shown on drawings. Locate closest adjacent expansion or weakened plane joint to define start of removal or saw-cutting.

B. Remove asphalt concrete paving areas where required for new construction as specified and as indicated on the Drawings.

1. Remove all paving by saw-cutting.
2. Remove paving assembly as required to expose subgrade.

3.06 LANDSCAPE AND IRRIGATION SYSTEMS DEMOLITION AND RENOVATION

A. Clearing, grubbing, and planting demolition.

1. Remove grass and grass roots to a minimum depth of two inches below existing grade.
2. Remove all shrubs, plants and other vegetation within the area of the work unless designated to remain. Grub and remove all roots of all vegetation to a depth of 24 inches below existing grade.
3. Remove only those trees which are specifically designated for removal, or as shown on the drawings, within the construction area. Remove all stumps. Remove root ball and root systems larger than 1 inch in diameter to a depth of two feet below existing or finished grades, whichever is lower and a minimum of five feet beyond the edge of paving, structure, wall or walkway.
4. Hand cut existing tree roots over 1 inch in diameter as necessary for trenching or other new construction, apply multiple coats of emulsified asphalt sealant especially made for horticultural use on cut or damaged plant tissues to cut faces and adjacent surfaces. Cover exposed roots with wet burlap to prevent roots from dying out until backfilling is complete.
5. Disking and mixing of vegetation, trash, debris, and other deleterious materials with surface soils prior to grading is not permitted.
6. Remove all buried debris, organic material, rubble, trash, or other material not deemed suitable by the Geotechnical Engineer.
7. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with fill material in compliance with Section 31 00 00.

8. Selected equipment of such sizes and capacities that the existing environment is disturbed as little as possible, and to afford ease of mobility within limited and relatively confined work areas. Make every effort to preserve the topography in its natural state.
9. Keep drains, catch basins, surface drainage courses and related drainage system components clear of debris and construction materials.
10. Remove irrigation piping and appurtenances as necessary within area of work, unless noted otherwise to remain. Replace irrigation piping and appurtenances to irrigate new and/or existing landscaping. Contractor shall be responsible for temporary landscape irrigation until such time that irrigation system is restored and operational.

3.07 DISPOSAL

Demolished materials become property of the Contractor and shall be removed from premises, except those items specifically listed to be retained by Owner.

- A. Dispose of all demolished material, trash, debris, and other materials not used in the work in accordance with the regulations of jurisdictional authority.
- B. It is recommended that all materials that are of a recyclable nature, be transported to a suitable legal recycling facility instead of a dump or refuse facility (unless they are one-in-the same).
- C. Burning and Burying of Materials: NOT ALLOWED.
- D. Haul Routes:
 1. Obtain permits as required by jurisdictional agencies. Establish haul routes in advance, post flagmen for the safety of the public and workmen.
 2. Keep streets free of mud, rubbish, etc.; assume responsibility for damage resulting from hauling operations; hold Owner free of liability in connection therewith.
- E. Remove demolished materials and debris from site on a daily basis.

3.08 CLEANING

- A. Upon completion of work of this Section promptly remove from the working area all scraps, debris.
- B. Clean excess material from surface of all remaining paved surfaces and utility structures.
- C. Power wash all concrete surfaces to remove stains, dried mud, tire marks, and rust spots.

END OF SECTION

**SECTION 03 30 00
CAST-IN-PLACE CONCRETE**

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Concrete Formwork.
- B. Reinforcement of Concrete.
- C. Concrete Placing and Finishing.

1.02 RELATED SECTIONS

- A. The Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 05 12 00: Structural Steel.
- C. Section 06 10 00: Rough Carpentry.

1.03 REFERENCES

- A. Chapter 19, CBC 2022.
- B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal Weight, Heavy Weight and Mass Concrete.
- C. ACI 301 - Specifications for Structural Concrete for Buildings.
- D. ACI 304R - Guide for Measuring, Mixing, Transporting and Placing Concrete.
- E. ACI 305R - Hot Weather Concreting.
- F. ACI 306R - Cold Weather Concreting.
- G. ACI 308 - Standard Practice for Curing Concrete.
- H. ACI 309R - Guide for Consolidation of Concrete.
- I. ACI 318 - Building Code Requirements for Structural Concrete.
- J. ASTM A615 / A615M – 09b - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- K. ASTM C33 / C33M-08 - Concrete Aggregates.
- L. ASTM C94 / C94M-09a - Ready-Mixed Concrete.
- M. ASTM C114- 09b - Methods of Chemical Analysis of Hydraulic Cement.
- N. ASTM C150 / C150M-09 - Portland Cement.

- O. ASTM C260-06 - Air Entraining Admixtures.
- P. ASTM C494 / C49M-08a - Water Reducing Admixtures.

1.04 QUALITY ASSURANCE

- A. All Concrete for the project shall be controlled concrete of specified strengths, of uniform color, and free from defects liable to adversely affect strength, durability or appearance of the structure or its components.
- B. Requirements of Regulatory Agencies: The quality and design of structural concrete shall comply with the requirements of the California Building Code, except where more stringent requirements are specified.
- C. Workmanship: Materials and methods used for the production and placement of concrete shall be such as to assure the specified quality and shall conform to applicable requirements of the Building Code for Reinforced Concrete (ACI 318) of the American Concrete Institute, except as otherwise specified in this Section.
 - 1. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Project Inspector. Work not so inspected is subject to uncovering and replacement.
 - 2. Proper installation of partitions and equipment requires the floor finish to be level and smooth throughout. Extreme care shall be exercised during all floating and troweling operations to check levels often.
 - 3. Any concrete work which does not comply with tolerances and elevations shown on drawings will be cause for rejection of all work affected, and, if so rejected, such work shall be removed and replaced at no increase in cost to the Owner.
- D. Repair of Defective Concrete Surfaces shall be done in the following manner when, in the opinion of the Architect, such defects may be repaired and at no additional cost to the Owner.
 - 1. Rock pockets, voids, spalls, cracks and exposed reinforcing shall be repaired with 1:2 cement mortar or cut out and patched. Prepare surfaces and bond cement mortar with concrete adhesive as hereinafter specified.
 - 2. Floor surfaces which exceed the allowable variation in plane or level (when an 8'-0" long straightedge is laid on the finished surface, the surface varies more than 3/16" in 8'-0") shall be ground and/or filled to obtain the level and plane required. Fill materials, where required, shall be of type approved by the Architect.
 - 3. Surfaces which are not plumb and square or which do not conform to the lines and levels indicated shall be chipped, ground, filled or trued as required to obtain the desired results.
- E. Uniformity of Concrete: All aggregates shall be measured by weight and the proportion of water to cement shall be accurately controlled by either automatic measuring devices or calibrated containers. All concrete placed shall be uniform strength and color appearance as well as surface texture.

- F. Screeds shall be provided all construction joints as required to ensure installation of concrete to lines and elevations noted.
- G. Concrete Replacement Inspection: Concrete shall not be poured until the forms, reinforcement, and preparations are complete and have been reviewed by the Project Inspector.
- H. Ready-Mixed Concrete: ASTM C94 / C94M-09a except as otherwise specified herein. Mix and deliver in accordance with the requirements set forth in ASTM C94 and ACI 301. Continuous Batch Plant inspection is required per CBC Section 1705.3.3. Contractor may request waiver of batch plant inspection in accordance with CBC Section 1705.3.3.1 provided the following is met:
 - 1. Approved Testing Laboratory shall check the first batching for each class of concrete and furnish mix proportions to the Licensed Weighmaster.
 - 2. Licensed Weighmaster to positively identify materials as to quantity and to certify to each load by ticket.
 - 3. Ticket shall be transmitted to Project Inspector by truck driver with load identified thereon. Project Inspector will not accept load without load ticket identifying mix and will keep daily record of pours, identifying each truck, its load and time of receipt and will transmit two copies of record to Architect.
 - 4. Do not add water at the site to concrete mixes with a maximum specified WCR unless the water content at batch time provides for a WCR less than specified and this provision, including the quantity of water which may be added at the site, is specifically noted on the Mix Design and Certification by the mix preparer.
 - 5. At end of project, Weighmaster shall furnish affidavit to Architect on form satisfactory to Architect, certifying that all concrete furnished conforms in every particular and to proportions established by mix designs.
- I. Tests: For structural concrete, the Testing Lab shall take four (4) test cylinders of concrete not less than once each day, not less than once for every 50 cubic yards of concrete, or not less than 2,000 square feet of slab or wall surface area. Cylinders shall be made and stored as per instructions given by the testing laboratory and shall be in accordance with ASTM Specifications C-31 / C31M-09 and C-39 / C39M-09a. Cylinders shall be tested for ultimate compressive strength of concrete with one cylinder tested at the age of 7 days and two (from the same batch) to be tested at the age of 28 days, with one cylinder held as a spare for future testing if needed. Tests shall be made by a recognized test laboratory selected by the Owner and approved by the Architect.
 - 1. Cylinders not meeting the required design stresses shall indicate defective concrete and such concrete shall be removed and replaced at no increase in cost to the Owner. Core tests requested by the Contractor to establish design stresses, when cylinder tests indicate defective concrete, shall be paid for by the Contractor.

1.05 SUBMITTALS

- A. Submit under provisions of Division 0, General Requirements.
- B. Manufacturer's Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joint systems, chemical floor hardeners, and others as may be requested by the Architect.

- C. Shop Drawings:
1. Shop drawings sheet size shall be 24" x 30" minimum and shall not be a reproduction of the construction documents.
 2. Reinforcing Steel: The correctness of the bending diagrams is the responsibility of the Contractor. Identify such shop drawings with a reference thereon to sheet and detail numbers from the contract drawings. No reinforcing steel shall be fabricated without approved shop drawings.
 3. Proposed location of constructions and cold joints when different or in addition to those shown on the drawings.
 4. Construction mount layout per paragraph 3.05.
- D. Concrete Mix Design: Submit proposed mix design prepared by concrete supplier. Mix design must be submitted to Owner for review and acceptance by a recognized independent testing lab, for all structural concrete.

1.06 JOB CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required by construction activities.

PART 2 – PRODUCTS

2.01 FORM MATERIALS

- A. Plywood Forms shall be exterior plyform, in large sheets of adequate thickness to support the imposed loads, but in no case less than 5/8" thick.
- B. Lumber Forms may be used for concrete surfaces that are unexposed and require no further surface applied materials. Lumber, if used, shall be clean and sound 2 x 12 No. 2 grade or better Douglas fir.
- C. Form Coating: Form shall be coated with nongrain-raising and nonstaining types of form coating that will not leave a residual matter on the face of the concrete or adversely affect proper bonding of any subsequent paint or other surface applications.
1. Form coating containing mineral oils or other nondrying materials will not be permitted for any concrete work.
- D. Form Ties: Snap off metal of fixed length: leaving no metal within 1-1/2 inches of surface and no fractures, spalls or other surface defects larger than one-inch diameter; manufactured by Burke, Dayton Superior, or accepted equal.
- E. Spreaders: Metal (no wood permitted).
- F. Form Release Agent: Colorless, non-staining, free from Lass; chemically active agent that shall not impair bonding of paint or other coatings intended for use.

2.02 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A615 / A615M -09b with Supplement S1, marked "S", Grade 60 for #4 bar and larger, Grade 40 for bars smaller than #4.
- B. Furnish 6x6 W1.4xW1.4 welded wire fabric in flat sheets; rolls will not be allowed.
- C. Wire Ties for tying reinforcing steel shall be #16 annealed wire.
- D. Bar Supports: Comply with CRSI "Recommended Practice for Placing Bar Supports, Specifications and Nomenclature, Latest Edition", except as otherwise specified. Wood is not permitted as supports for reinforcing.
- E. Spacers and Chairs: As manufactured by Kalman Steel Company, Concrete Engineering Company, or approved equal.

2.03 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150 / C150M-09, Type II, low alkali. All cement used shall be of one manufacturer.
 - 1. Use Type IIA cement if pumping of concrete is selected and permitted for placing of concrete.
 - 2. All cement shall contain not more than 0.6 percent total alkali when calculated as sodium oxide as determined by "Methods of Chemical Analysis of Hydraulic Cement", ASTM C114-09b.
- B. Fly Ash: Western Fly Ash, conforming to ASTM C618 for Class N or Class F materials (Class C is not permitted). Not more than 15% (by weight) may be substituted for portland cement.
- C. Water: Clean and free from deleterious amounts of acids, alkalis, salts and organic matter.
- D. Concrete Aggregates: ASTM C33 / C33M-08 except as otherwise specified hereinafter. All aggregates shall be nonreactive and nondegenerative, and shall consist of sound crushed rock, washed gravel, or a combination of both.
 - 1. Modify fine aggregates when air entrained concrete is used in accordance to Paragraph 4.2.4 of ASTM C33 / C33M-08.
 - 2. Aggregate sources shall be approved by the Architect. Aggregate shall result in shrinkage of concrete not exceeding .048 percent at 28 days. Testing lab shall verify aggregate and concrete shrinkage.
 - 3. Do not use fine or course aggregates that contain substances that are known to cause spalling or adverse reactions in the concrete.
- E. Admixtures: Except for admixtures noted below, no other admixtures shall be used without written approval from the Architect. Where such agents are permitted, they shall be a type approved and used only as directed by the Architect and at no increase in cost to the

Owner. Agents including calcium chloride will not be permitted for use in concrete under any circumstances

1. Air Entraining Agents: ASTM C260. Use where specified. The maximum entrained air content shall be no more than 4 percent + 1 percent by volume unless noted otherwise. Approved air entraining agents are Sika AER, Master Builders Micro Air, Darex AEA, and Protex AEA.
2. Water Reducing Admixtures: ASTM C494 and ACI 318, Section 3.6. Use where specified. Approved agent is Master Builders Pozzoloth 322-N, used at the rate of 5+2 fluid ounces per 100 pounds of cement.

2.04 CRUSHED ROCK BASE

- A. Under all new concrete ramps and paving, or as otherwise indicated on the Drawings, provide a minimum of 4 inches of crushed rock fill. Crushed rock fill shall be clean gravel of 1" max. size and have no material passing through a No. 4 sieve.

2.05 JOINT MATERIAL

- A. Provide 3/8" wide fiber expansion joint material, Model No. 320-F, as manufactured by W.R. Meadows or equal.
- B. Provide Snap-Cap as manufactured by W.R. Meadows or equal. Snap-Cap shall have a top plastic edge that can be used for leveling concrete. Once concrete has set up, top edge of Snap-Cap can be pulled free and discarded. Joint shall then be sealed.
- C. Joint sealing material shall be a two-component, self-leveling, polyurethane elastomeric sealant. Product shall be Sikaflex 2cSL as manufactured Sika Corporation, or equal. Color shall be chosen from the full range of manufacturer's standard colors.

2.06 RELATED MATERIALS

- A. Concrete Adhesive and Bonding Agent: "Concresive #1001-LPL" (1-1/2 hour maximum pot life), an epoxy polysulfide type concrete adhesive as manufactured by Master Builders or equal.
- B. Liquid Curing Compound: W.R. Meadows, Product: "Vocomp-20" or equal.
- C. Bonding Adhesive: Burke, Bondcrete-S; use as a modifier for patching and overlays up to 1/2" thick or equal.
- D. Vapor Barrier: Stego Wrap, 15 mil. vapor barrier system, with a Class A rating, and perm rating not to exceed 0.01 perms; by Stego Industries of San Juan Capistrano, CA (877) 464-7834, VaporGuard by Reef Industries (713) 507-4250., Sundance 15 mil Vapor Barrier by Sundance Inc. (855) 300-7156, or 15 mil Husky, Yellow Guard, Vapor Barrier by Poly-America (800) 527-3322. No substitutions will be accepted. System to include Stego Mastic, Stego "Crete Claw Tape" and pipe boots, or accepted equal by the specified manufacturers. Conform to ASTM 1745.
- E. Drilled-in Concrete Anchors: Hilti "Kwik Bolt TZ2" (ICC-ES ESR-4266), Simpson Strong-Tie "Strong-Bolt 2" (ICC-ES ESR-3037) or accepted equal.

1. Install per manufacturer's recommendation; use stainless steel for all exterior work.
 2. Testing required as noted in the Structural Drawings.
- F. Patching Mortar: Meadow-Crete GPS, one-component, trowel applied, polymer enhanced, shrinkage-compensated, fiber reinforced, cementitious repair mortar for horizontal, vertical and overhead applications as manufactured by W.R. Meadows or accepted equal

2.07 CONCRETE DESIGN

- A. Designed Strength and Classes of Concrete:
1. Class "A" concrete of 1" max. size aggregate shall have 2500 psi 28 day strength with a maximum water to cementitious materials ratio of 0.48. Use for all concrete.
- B. Slump of Concrete: The slump of concrete as determined by the Standard Test Method for Slump of Hydraulic Cement Concrete ASTM Designation C-143 / C143M-09 shall be as follows:
1. Class "A": 4" plus or minus 1" (5" maximum).
- C. Laboratory Mix Design: Concrete designs shall be reviewed by the Testing Laboratory. The concrete mix designs reviewed by the Testing Laboratory and approved by the Project Architect or Structural Engineer shall be used by the Contractor. Contractor shall provide samples of aggregates as required by the laboratory to review the mix designs.
- D. Water Reducing Admixture: Unless noted otherwise, all concrete shall contain a water reducing admixture.

2.07 CONCRETE MIXING

- A. Ready-Mixed Concrete: ASTM C94 / C94M-09a except as otherwise specified herein.
1. Transit-mixed concrete shall be mixed for a period of not less than 10 minutes at a peripheral drum speed of approximately 200 feet per minute, and mixing shall be continued until discharge is complete. At least 3 minutes of the mixing period shall be at the job. Transit mixers shall be equipped with water measuring devices consisting of either accurately calibrated water tanks or water meters.
 2. When outside air temperature is between 85 degrees and 90 degrees, reduce mixing and delivery time from 90 minutes to 75 minutes. When outside air temperature is above 90 degrees, reduce mixing and delivery time to 60 minutes
- B. Job Mixing: Non-structural concrete only. The capacity of the mixer shall be such that it will handle one or more full sack batches. No split sack batches will be permitted except when all materials are weighed. The rated capacity of the mixer shall not be exceeded. The mixing drum shall be equipped with an automatic timing and locking device and with an accurate water gauge for measuring the amount of water used. Mixing time of each batch shall be at least 1-1/2 minutes after all ingredients are in the mixer.

PART 3 – EXECUTION

3.01 FORMS

- A. Build and Erect Forms to conform to the required shapes, patterns, lines, grades and dimensions indicated. Forms shall be substantial and tight to prevent any leakage of mortar, properly braced and tied together to maintain their position and shape. Forms shall not deflect under the dead load weight of the plastic concrete or construction loads. Joints in forming material shall be butted tightly and shall bear on solid construction. Provide tool edges where indicated. Completed form work to be checked for grade and alignment to tolerances not exceeding 1/8" in 10'-0" for top of forms and not more than 1/4" in 10'-0" for vertical face.
- B. Cast-in Items: Set in formwork all new sleeves, inserts, anchors, and similar items furnished and required under the work of other sections. Brace, anchor and support cast-in-items to prevent displacements and distortions.
- C. Clean forms after each use and coat with release agent as required.
- D. Space clamps, ties, hangers and other form accessories so that working capacities are not exceeded by loads imposed from concrete or concreting operations.
- E. Build openings into vertical forms at regular intervals if necessary to facilitate concrete placement, and at bottoms of forms to permit cleaning and inspection.
- F. Build in securely braced temporary bulkheads, keyed as required, at approved locations of construction joints.
- G. Slope tie-wires downward to outside of wall.
- H. During and immediately after concrete placing, tighten forms, posts and shores. Readjust to maintain grades, levels and camber.
- I. No metal or wood stakes are allowed in areas to be concreted.

3.02 REINFORCEMENT FABRICATION

- A. Steel reinforcement shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the Drawings shall not be used. Heating of the bars for bending will not be permitted.
 - 1. Spacers and chairs shall be as specified or detailed and spaced such that steel reinforcement will be carried without deflection.
 - 2. Concrete blocks may be used to support bottom layer of steel in floor slabs on grade.
 - 3. Bars shall be in long lengths with laps and splices as shown. Offset laps 5'-0" minimum in adjacent bars. Place steel with clearances and cover as shown. Bar laps shall be as indicated on the drawings. Tie all laps and all intersections with specified wire. Maintain clear space between parallel bars not less than 1-1/2 times

nominal diameter for round bars, or twice side dimension for square bars, but in no case shall clear space be less than 1-1/2", nor less than 1-1/2 times maximum size concrete aggregate.

4. Reinforcing dowels for slabs shall be placed as detailed. Grease one penetration so that pour will not bond to dowel. Sleeves may be used if approved by the Architect before installation. Install dowels through all construction and expansion joints for all slabs on grade.
 5. Install welded wire fabric in lengths as long as possible. Lap adjoining pieces at least one full mesh and lace splices with wire ties. Offset laps of adjoining widths to prevent continuous laps in either direction.
 6. Cut bars true to length with ends square and free of burrs.
- B. Drawing Notes: Refer to notes on Drawings for additional reinforcement requirements.
- C. Welding of reinforcing bar shall be performed only where indicated on plans and in compliance with AWS D1.4. All welding of reinforcement is to be inspected in accordance with CBC Table 1705A.2.1, Item 5(b).

3.03 CONCRETE PLACEMENT

- A. Surrounding Conditions: Before any concrete is placed, the following items of work shall have been completed in the area of placing.
1. Forms shall have been erected, adequately braced, cleaned, sealed, lubricated if required, and bulkheaded where placing is to stop.
 - a. Any wood forms other than plywood shall be thoroughly water soaked before placing any concrete. The wetting of forms shall be started at least 12 hours before concreting.
 2. Reinforcing steel shall have been placed, tied, supported, and, at the time the concrete is placed around it, shall be cleaned of rust, scale, mill scale or other coatings that will destroy or reduce bond.
 3. Embedded work of all trades shall be in place in the forms and adequately tied and braced.
 4. The entire place of deposit shall have been cleaned of dirt, chips, sawdust, rubbish, debris, hardened concrete and other foreign matter before concrete is deposited therein. No wooden ties nor blocking shall be left in concrete except where indicated for attachment of other work.
 5. Concrete surfaces to which fresh concrete is to be bonded shall be saw cut and broken away as indicated. Surfaces shall be brush cleaned to remove all dust and foreign matter and to expose the aggregate, and then coated with the bonding adhesive herein specified.
- B. Conveying Concrete from mixer to forms shall be as rapid as possible.
1. Ready-mixed concrete shall be mixed and delivered in accordance with ASTM C94

/ C94M-09a. A delivery ticket shall be furnished for each load of ready-mix or transit-mix concrete. A copy of each delivery ticket shall be handed to the job superintendent at the time of delivery and unloading. A record copy of the delivery tickets shall be forwarded to the Architect for his files.

2. Conveying equipment shall be of a sufficient capacity to ensure a practically continuous flow of concrete to the placing point without separation or loss of materials. Carts and buggies shall be equipped with pneumatic tires. Runway supports shall not bear on reinforcing or fresh concrete. All conveying equipment shall be thoroughly cleaned before beginning and at frequent intervals during the placing of the concrete.
 - a. Chutes, if employed, shall slope not less than 4" or more than 6" per foot of horizontal run.
 3. Exercise care not to spill concrete on forms and reinforcing steel during the conveying operations. Where such spillage or splattering occurs, the surfaces shall be thoroughly cleaned before concrete hardens.
- C. Placing Concrete: Notify the Architect at least 48 hours in advance of beginning of pouring operations. Under no circumstances shall concrete that has partially hardened be deposited on the work. No concrete shall be placed during rainy weather without the Architect's approval.
1. The Project Inspector shall keep a record on the site of the time and date of placing the concrete in each portion of the structure in accordance with CBC Section 1705.3.6. The record shall be kept until the completion of the structure and a copy provided to the Architect.
 2. Before starting new pour on or against concrete that has hardened, forms shall be retightened and the hardened concrete roughened and thoroughly cleaned of foreign matter and any laitance by sandblasting. Just ahead of the new pour, slush joints with a 2" layer of grout of the designated concrete mix minus 50 percent of the large aggregate.
 3. Reinforcing steel exposed to the sun shall be cooled by a water spray prior to the placing of concrete.
 4. No adjustment of steel reinforcement will be permitted during the placement of concrete.
 5. Concrete shall be scheduled so that the placing is a continuous operation for the completion of each section between predetermined construction joints. If a planned concreting operation cannot be carried on continuously, the concreting shall stop at temporary bulkheads. Locate where resulting construction joints shall be as shown on the Drawings or as approved by the Architect. Prior to placing of concrete for any concrete slabs, the moisture content of the subgrade below the slabs shall be adjusted to at least optimum moisture.
 6. Deposit the concrete in forms as nearly as practicable in its final position to avoid flowing and maintain until completion of the unit an approximate horizontal plastic surface. Thoroughly compact all concrete during placing operations, thoroughly around reinforcement, embedded fixtures or accessories, and into the corners of

forms to eliminate air pockets and honeycombing. Compacting shall be done with mechanical vibrators. Vibrators shall not be used to cause concrete to flow horizontally. Thoroughly compact concrete to the forms to release the air and secure full contact of the concrete with the forms.

7. Hot Weather Concreting: Concrete placing and finishing operations during hot weather shall be done as quickly as possible. Ample personnel shall be available to handle and place the concrete immediately after its mixing or delivery to the site of the work. Concrete shall be placed in layers thin enough and over areas small enough to ensure complete bond and union of adjacent layers, and thus prevent "cold joints".
 - a. At air temperatures of 80 degrees Fahrenheit or above the following precautions should be taken:
 - 1) In no case shall the temperature of the concrete exceed 90 degrees Fahrenheit when placed in the work.
 - 2) If necessary to produce and maintain concrete at an acceptable temperature, chopped or crushed ice shall be added directly into the mixer up to 50 percent by weight of the mixing water used, the weight of the ice being included in batch weight of the mixing water. The ice shall be added at such a rate and in such a manner that it will be completely melted by the time concrete is mixed.
 - 3) Stockpiled aggregates shall be saturated and kept surface moist by continuous fog spray or by intermittent sprinkling.
 - 4) Forms, reinforcements and subgrade surfaces shall be wet down immediately before concrete is placed in contact therewith. Remove all excess water before placing concrete. Wetting down of areas around the work to cool the surrounding air and increase the humidity is recommended.
8. Cold Weather Requirements: Do not place concrete when ambient temperature is below 40 degrees Fahrenheit and falling.

3.04 CONCRETE FINISHING

- A. All Concrete Work, except as otherwise specified, shall be of a quality that will present a finished appearance upon the stripping of the forms. Only a minimum of patching and finishing should be necessary as required to fill holes left by form ties and to remove any fins or minor irregularities left by the joints in the forms. Except as otherwise specified, all concrete surfaces shall be finished as follows:
- B. Final Tooling: Tool edges of paving, gutters, curbs and joints formed in fresh concrete with a jointing tool to a radius of 1/4". Repeat tooling of edges and joints after applying surface finishes. Eliminate tools marks on all concrete surfaces.
- C. Polish finish concrete areas where indicated on the Drawings and per Section 03 35 43, Concrete Polishing.

3.05 CONSTRUCTION JOINTS

- A. Control joints shall be saw cut into concrete as soon as concrete slab can be walked on. Do not wait until the following day to saw cut concrete slab control joints.
- B. Construct contraction, construction, and isolation joints true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to the centerline unless otherwise indicated.
- C. Joints at Existing Concrete: All joints between existing concrete and new concrete are to include dowels at a minimum of #4 bars @ 4'-0" on center, 18" maximum from the ends, epoxy set into existing concrete a minimum of 6" in length at the centerline of existing concrete slab.
- D. Contraction Joints (Control Joints): Provide weakened-plane contraction joints, sectioning concrete into areas indicated. Construct contraction joints for a depth equal to at least 1/4 of the concrete thickness. Form in fresh concrete by grooving and finishing each edge of joint with a radiused jointer tool. Joints to be spaced at 10' on center maximum or as shown on the drawings.
- E. Construction Joints: Set construction joints at side and end terminations of concrete placement and at locations where placement operations are stopped for more than 1/2 hour, unless placement ends at isolation joints.
 - 1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys. Use Burke "Keyed Kold Joint Header Form" or approved equal. Embed keys at least 1 1/2" into concrete.
 - 2. Continue reinforcement across construction joints.
 - 3. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- F. Isolation Joints (Expansion Joints): Form isolation joints of preformed joint filler strips abutting concrete curbs, catch basin, manholes, inlets, structures, walks, other fixed objects, and where indicated.
 - 1. Extend joint fillers full width and depth of joint, not less than 1/2" or more than 1" below finished surface where a joint sealant is indicated. Place top of removable joint filler flush with finished concrete surface.
 - 2. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary, removable preformed cap.
 - 3. After concrete has set up, remove cap exposing top edge of fiber joint filler, and apply joint sealant.

3.06 PUMPING OF CONCRETE *(may be permitted for concrete, providing the following):*

- A. The Contractor engages a testing laboratory to design concrete mixes for pumping. Trial batches shall be made and tested as required hereinbefore for typical concrete.
- B. The quality and proportioning of aggregates for pumping conditions shall be determined in accordance with ACI, Recommended Practice 613. Aggregate proportioning must be

tailored to the particular pump intended for use.

- C. When starting a pump operation, actual pumping of concrete shall be preceded by a mortar mix (concrete without coarse aggregate) for the purpose of lubrication.
- D. All mortar and concrete leakage resulting from pumping operations shall be removed from formwork, reinforcing steel and any finished surface.

3.07 CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperature. Comply with the recommendations of ACI 306R for cold weather protection and ACI 305R for hot weather protection during curing.
- B. Evaporation control is to be implemented in hot, dry and windy weather by protecting concrete from rapid moisture loss before and during finishing operations with an evaporation control material. Apply in accordance with manufacturer's instructions after screeding and bull floating, but not before floating.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination.
 - 1. For moisture-curing, keep surfaces continuously moist for not less than 7 days with water, a continuous water-fog spray, or absorptive cover kept wet continuously wet.
 - 2. For moisture-retaining-cover, cover concrete with moisture retaining cover with side and end laps sealed.
 - 3. For curing compound, apply in accordance with manufacturer's instructions. Recoat areas subjected to rainfall within 3-hours after initial application.
- D. Forms shall remain in place for not less than the following periods of time. These periods represent minimum cumulative number of days during which temperature of air in contact with concrete is 60 degrees F and above.
 - 1. Vertical forms of foundations and walls: 5 days.
 - 2. Slab edge screens or forms: 7 days.
 - 3. Concrete columns and beam soffits: 28 days.

3.08 CLEANING AND PROTECTION

- A. Clean all surfaces and leave in satisfactory condition to receive final finish surface treatment.
- B. Protect concrete surfaces from damage by tools, equipment, material and workmen. No traffic, shoring or other loading will be permitted until concrete has hardened sufficiently to prevent injury to finish and strength, but at least 14 days.
 - 1. Remove surface stains and spillage of materials as they occur.

03 30 00
CAST-IN-PLACE CONCRETE

2. Sweep concrete and wash free of stains, discolorations, dirt, and other foreign material prior to final inspection.

END OF SECTION 03 30 00

**SECTION 05 12 00
STRUCTURAL STEEL**

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Structural steel framing members and support members.
- B. Baseplates.
- C. Grouting under baseplates.

1.02 RELATED SECTIONS

- A. Section 03 30 00: Cast-in-Place Concrete.
- B. Section 06 10 00: Rough Carpentry

1.03 REFERENCES

- A. ASTM A36 / A26M-08 - Carbon Structural Steel.
- B. ASTM A53 / A53M-07 - Black and Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
- C. ASTM A307 – 07b - Carbon Steel bolts and studs, 60,000 psi tensile strength.
- D. ASTM A500 / A500M-09 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- E. ASTM A563-07a - Carbon and Alloy Steel Nuts.
- F. ASTM A706 / A706M-09b, Low Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
- G. ASTM ASTM A992 - Standard Specification for Structural Steel Shapes.
- H. ASTM F436- 09 - Hardened Steel Washers.
- I. ASTM F844-07a - Washers, Steel, Plain (flat), Unhardened for General Use.
- J. ANSI B18.23.1 (R1975) Beveled Washers.
- K. AWS A2.4 - Standard Welding Symbols.
- L. AWS D1.1 - Structural Welding Code - Steel.
- M. AISC 360 - Specification for Structural Steel Buildings.
- N. AISC 303 - Code of Standard Practice.
- O. SSPC - Steel Structures Painting Council.

- P. AISC - Quality Criteria and Inspection Standards.

1.04 SUBMITTALS

- A. Submit under provisions of the General Conditions.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, and locations of structural members, attachments, fasteners, connections and connections not detailed. Errors in dimensions shown on shop drawings shall be the responsibility of the Contractor.
 - 2. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
 - 3. Clearly distinguish between shop and field bolts and welds.
- C. Manufacturer's Mill Certificate: Submit under provisions of the General Conditions certifying that steel, fasteners, and welding electrodes meet or exceed specified requirements.
- D. Mill Test Reports: Submit under provisions of the General Conditions Manufacturer's Certificates, indicating structural strength, destructive and non-destructive test analysis, and ladle analysis.
- E. Welders' Certificates: Submit under provisions of the General Conditions Manufacturer's Certificates, certifying welders employed on the Work, verifying AWS qualifications within the previous 12 months.
 - 1. Welders who have not performed welding for period of three (3) or more months shall be requalified.
 - 2. Welders whose work fails to pass inspection shall be requalified before performing further welding.
 - 3. The Contractor shall pay costs of certifying qualifications.
- F. Templates: Furnish templates and other devices as necessary for presetting bolts and anchors to accurate locations.

1.05 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC - Specification for Structural Steel Buildings, Code of Standard Practice for Steel Buildings and Bridges and Quality Criteria and Inspection Standards.

1.06 QUALIFICATIONS

- A. Fabricator: Company specializing in performing the work of this Section with minimum five years documented experience. Certification in Category 1 - conventional steel structures per the AISC Quality Certification Program.
- B. Erector: Company specializing in performing the work of this Section with minimum five years documented experience.

1.07 FIELD MEASUREMENTS

- A. Verify that field measurements are as shown on shop drawings.
- B. Coordinate fabrication and delivery of structural steel items with concrete work and with all other trades to permit such items to be built into the structure without delay.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials to be Installed Under Other Sections: Anchor bolts and other anchorage devices which are embedded in cast-in-place concrete construction shall be delivered to the project site in time to be installed before start of cast-in-place concrete operations.
- B. Storage of Materials:
 - 1. Structural steel members which are stored at the project site shall be above ground on platforms, skids or other supports.
 - 2. Steel shall be protected from corrosion.
 - 3. Other materials shall be stored in a watertight, dry place until ready for use in the work.
 - 4. Packaged materials shall be stored in their original package or container.
 - 5. Do not store materials on the structure in a manner that might cause distortion or damage to members of supporting structures. Repair or replace damaged materials or structure as directed by Architect.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Structural Steel Members: ASTM A36 / A36M-08 or ASTM A572 / A572M-07 Grade 50 where noted on plans.
- B. HSS Structural Tubing: ASTM A500 / A500M-09, grade C.
- C. Bolts and Nuts: ASTM A307-07b, grade A, with ASTM A563 – 07a, Grade A, hex nuts.
- D. Welding Materials: AWS D1.1 E70 or equivalent, except no E70T-4 allowed.
- E. Circular washers for common bolts: ASTM F844-07a, Type A. and ANSI B18.22.1.
- F. Beveled washers for common bolts: ANSI B18.23.1.
- G. Shop and Touch-Up Primer: TNE MEC 10-99, red metal primer or Devco DEVGUARD 4141.
- H. Expansion Anchors: Refer to Section 03 30 00.

- I. Drypack: Drypack shall consist of one part High Early Strength Portland Cement to not more than three parts of sand by volume. Add only a minimum amount of water to hold the mixture in shape while packing and to provide hydration. Solidly ram drypack into place to provide uniform bearing and cure with moist sacks or cloths for a period of at least three (3) days.
- J. Grout ASTM C1107: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days.
- K. Reinforcing steel: Refer to Section 03 30 00.

2.02 FABRICATION

- A. General: Fabricate items of structural steel in accordance with AISC specifications and as indicated on the Drawings. Properly mark and match-mark all materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling.
 - 1. Welded splicing of structural members may be done only upon written approval by the Architect unless shown otherwise on the Drawings. Splicing shall be thoroughly examined by a nondestructive means at the Contractor's expense. Inspection shall be made by a recognized and approved testing laboratory; procedure, technique and standards of acceptance shall conform to Appendix E of AWS Standard D.2, 0-66. Correct faulty welds and re-examine in a manner specified for original welds.
- B. Welded Construction:
 - 1. Weld in accordance with AISC using manual shielded arc method or flux cored arc method in accordance with AWS D1.1 and CBC Chapter 22.
 - 2. Groove welds shall be complete joint penetration welds, unless specifically designated otherwise on drawings.
 - 3. Weld reinforcing steel in accordance with AWS D1.4 and using prequalified procedures.
- C. Connections:
 - 1. Weld or bolt shop connections as indicated.
 - 2. Bolt field connections except where welded or other connections are indicated. Provide unfinished threaded fasteners only where noted on drawings and for temporary bracing to facilitate erections.
- D. Holes, Cutouts, and Fittings:
 - 1. Bolt Holes: Bore holes same diameter as bolt shank plus 1/16" in all members, except column base plates attaching to concrete foundations. Bolt holes in such column base plates may be the bolt shank plus 3/16" with standard nuts or the bolt shank plus 5/16" with heavy hex nuts. Use slotted or oversize holes only where specifically indicated on contract drawings.
 - 2. Provide holes required for securing other work to structural steel framing, and for the passage of work through steel framing members as indicated. Provide

threaded nuts welded to framing, and other specialty items as shown to receive other work. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.03 FINISH

- A. Prepare structural component surfaces in accordance with SSPC SP-2.
- B. Shop prime structural steel members. Do not prime surfaces that will be field welded or in contact with concrete, or surfaces to receive fireproofing.

2.04 SOURCE QUALITY CONTROL AND TESTS

- A. Testing and analysis of components will be performed under provisions of the General Conditions.
- B. General: The Owner will engage and pay a testing agency to perform the following services.
 - 1. Review Manufacturer's certificates and check heat numbers and that the steel is properly identified in accordance with CBC 2022 edition, 2202.
 - 2. Testing of unidentified materials or as directed by Owner.
 - 3. Visually inspect shop and field welds per CBC 2022 edition, Section 1705.2.5.
 - 4. Perform any physical tests of structural steel as required by the Architect. Perform ultrasonic tests on members as determined by the Architect to determine if delamination defects in steel members are evident.
 - 5. All defective welds shall be repaired and tested at no expense to the Owner.
 - 6. Test wedge anchors per the following:
 - a. If the design tension is less than seventy-five (75) pounds, and those anchors are clearly noted on the documents, then only ten (10) percent of the anchors need be tested.
 - b. In the absence of ICBO allowable values for a particular anchor, the test load(s) shall be twice the established tension value.
 - c. The test load may be applied by any method that will effectively measure the tension in the anchor, such as direct pull with a hydraulic jack, calibrated spring loading devices, or a calibrated torque wrench, etc. Anchors in which torque is used to expand the anchor without applying tension to the bolt (Torque Controlled Anchor) should not be verified with a torque wrench until the Office has sufficient data from either the manufacturer or from independent testing to establish appropriate torque values. Examples of these types of anchors are the Hilti HSL, USE Taperbolt, and Lag Shield type anchors.
 - 7. Failure/Acceptance Criteria: The following criteria apply for the acceptance of installed anchors:

- a. Hydraulic Ram Method: The anchor should have no observable movement at the applicable test load. For wedge and sleeve type anchors, a practical way to determine observable movement is that the washer under the nut becomes loose.
- b. Torque Wrench Method: The applicable test torque must be reached within the following limits:

Wedge or Sleeve Type: One-half (1/2) turn of the nut. One-quarter (1/4) turn of the nut for the 3/8 in. sleeve anchor only.

If any anchor fails testing, test all anchors of the same category not previously tested until twenty (20) consecutive pass, then resume the initial testing frequency.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.
- C. Bolts shall be clean and free of grease, oil, and all other deleterious substances.

3.02 ERECTION

- A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing per AISC Code of Standard Practice.
- B. Field weld components indicated on shop drawings.
- C. Do not field cut or alter structural members without approval of Architect.
- D. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- F. Structural Steel Work shall be set accurately at established lines and levels. Steel shall be plumb and level before final bolting or welding is commenced and after complete erection. All cutting, notching, coping, etc., required to properly assemble and fit parts and members shall be done by steel fabricator. Such workmanship shall be equal in quality to shop work.
 1. Coordinate the erection of structural steel with other trades and locate temporary guys, braces, falsework and cribbing as may be necessary for erection so as not to interfere with the progress of other work.
 2. All compression joints which depend upon contact bearings shall have bearing surfaces milled and truly faced.
 3. Rolled sections, except for minor details, shall not be heated except for welding operations.
 4. Upon approval of the Architect, gas cutting may be permitted if the metal being cut is not highly stressed during the operation. Stresses shall not be transmitted through a flame cut surface unless such surfaces are cut by a mechanically guided

torch. The radius of re-entrant flame cut fillets shall be as large as possible, but never less than 1 inch. To determine the net area of members so cut, 1/8" shall be deducted from the flame cut edges not made by a mechanically guided torch. Gas cuts shall be smooth and regular. Holes for bolts shall not be cut with a torch.

5. All contact surfaces shall be cleaned before assembly.
 6. Provide setting diagrams and templates as required.
- G. Connections shall be as specified hereinbefore under "Fabrication". In addition, bolted connections shall conform to the following requirements:
1. Beveled washers shall be used under all bolt heads and nuts where they rest on beveled surfaces.
 2. Connectors shall have hexagon heads and nuts.
 3. Nuts shall be drawn up tight. Check threads of unfinished bolts with chisel or approved self-locking nuts.
 4. Bolts that have been completely tightened shall be marked with identifying symbol.
- H. Framing shall be carried up true and plumb, and temporary bracing shall be introduced wherever necessary to take care of all loads to which structure may be subjected, including erection equipment and its operation. Such bracing shall be left in place as long as may be required for safety. It shall finally be removed by the contractor as part of his equipment. As erection progresses, the work shall be securely connected to take care of all dead load, lateral loads and erection stresses. No final bolting or welding shall be done until the structure has been properly aligned.

3.03 ERECTION TOLERANCES

- A. Level and plumb steel within the tolerances defined in the AISC Code of Standard Practice, latest edition.
1. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative,
 2. Maximum Offset from True Alignment: 1/4 inch.
- B. Acceptance of Position and Alignment: Prior to placing or applying any other materials, the Contractor is responsible for determining that the location of the structural steel is acceptable for plumbness, level and alignment within tolerances. The erector is given timely notice of acceptance by the Contractor or a listing of specific items to be corrected in order to obtain acceptance. Such notice is rendered immediately upon completion of work and prior to start of work by other trades that may be supported, attached to the structural steelwork.

3.04 CLEAN-UP:

- A. Upon completion of the work of this section, remove all surplus materials, rubbish and debris from premises.

END OF SECTION 05 12 00

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: The following light-gauge steel framing supplementing the requirements indicated on the Drawings.
 - 1. Suspended soffits

1.2 RELATED REQUIREMENTS

- A. Section 01 6116, Volatile Organic Compound (VOC) Restrictions; for VOC limits pertaining to adhesives, sealants, fillers, primers, and coatings.
- B. Section 01 8113, Sustainable Design Requirements, for CAL-Green general requirements and procedures.

1.3 REFERENCES AND STANDARDS

- A. California Building Code (CBC), edition as noted on the Drawings, as adopted by the California Division of the State Architect (DSA).
- B. California Green Building Standards Code (CAL Green), edition as noted on the Drawings, as adopted by the California Division of the State Architect (DSA).
- C. American Galvanizers Association (AGA):
 - 1. Recommended Practice for Touch-up of Damaged Galvanized Coatings.
- D. American Iron and Steel Institute (AISI):
 - 1. S100: North American Specification for the Design of Cold-formed Steel Structural Members.
 - 2. S240: North American Standard for Cold-Formed Steel Structural Framing.
- E. American Welding Society (AWS):
 - 1. D1.3/D1.3M: Structural Welding Code – Sheet Steel.
 - 2. A5.1/A5.1M: Specification for Carbon Steel Electrodes.
 - 3. A5.18/A5.18M: Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding.
- F. ASTM International (ASTM):
 - 1. A653/A653M: Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. A641/A641M: Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

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3. A780/A780M: Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
4. A1003/A1003M: Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
5. C1513: Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
6. E119: Test Methods for Fire Tests of Building Construction and Materials.
7. E488/E488M: Standard Test Methods for Strength of Anchors in Concrete Elements.
8. E814: Standard Test Method for Fire Tests of Penetration Firestop Systems.
9. F1941/F1941M: Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric.

- G. International Code Council (ICC) Evaluation Service: Evaluation Reports as noted.
H. Underwriters Laboratory (UL):

1. 2079: Test for Fire Resistance of Building Joint Systems.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures:

1. Action Submittals and Informational Submittals shall be submitted in accordance with Section 01 3300, Submittal Procedures.
2. Sustainable Design Submittals shall comply with the additional requirements of Section 01 8113, Sustainable Design Requirements.

1.5 ACTION SUBMITTALS

- A. Shop Drawings

1. Show size and locations of framing members in conformance to the criteria shown on the Drawings.
2. Shop and field assembly details, including cuts and connections. Details must reference detail callouts on the construction documents.
3. Type and location of shop and field welds, rivets, bolts, and fastening devices.

- B. Product Data:

1. Descriptive data illustrating cold-formed framing system components including fasteners and accessories, including ICC-ES reports.
2. Erection instructions containing sequence of operations.

- C. Samples: Provide adequate samples of unidentified material to the Owner's Testing Laboratory for testing purposes or if specifically requested.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and installer.

- B. Certification for each welder.
- C. Sustainable Design:
 - 1. General:
 - a. Submit information necessary to establish and document compliance with the California Green Building Standards Code.
 - b. Sustainable design submittals are in addition to other submittals.
 - 2. The following information shall be provided:
 - a. Adhesives and Sealants: Evidence of compliance that products meet maximum VOC content limits specified in Section 01 6116.

1.7 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in structural framing components with three years minimum experience.
 - 2. Installer: Company specializing in work of this Section with minimum 3 years' documented experience.
 - 3. Welders: Qualified for light gauge welding in accordance with AWS D1.3/D1.3M.
- B. Regulatory Requirements:
 - 1. Comply with fire-resistance ratings as indicated and as required by governing authorities and codes.
 - 2. Provide materials, accessories, and application procedures listed by an approved testing agency or tested according to ASTM E119 for the type of construction shown.
 - 3. Comply with requirements of CBC, Sections 2201 and 2210 for design and identification of cold-formed steel.
 - 4. Framing system shall conform to ICC-ES Report for stud gauge and spacing for all wall conditions.
- C. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.
- D. Single Source Responsibility: Use materials and products of one manufacturer whenever possible.
- E. Materials, components, assemblies, workmanship and installation are to be observed by the Owner's Project Inspector. Work not so inspected is subject to uncovering and replacement.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

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- B. Store materials in protected, clean, dry conditions off of ground and in areas so as to not interfere with the progress of the Work.
- C. Transport, store and handle in strict accordance with manufacturer's written recommendations.

1.9 DESIGN AND PERFORMANCE CRITERIA

- A. Sustainable Design:
 - 1. VOC emissions for field-applied adhesives, sealants, and sealant primers must comply with limits specified in Section 01 6116.

1.10 LIGHT-GAGE METAL FRAMING

- A. General:
 - 1. Structural framing shall comply with ASTM C955.
 - 2. Nonstructural framing shall comply with ASTM C645.
 - 3. Thickness or gauge identification shall be color coded in accordance with ASTM C955.
- B. Sheet Steel: ASTM A1003/A1003M, Type H, metallic coated of grade and coating weight as follows:
 - 1. 43 Mils (20-gauge) and Lighter: ST33H with minimum yield point of 33 ksi.
 - 2. 54 Mils (18-gauge) and Heavier: ST50H with minimum yield point of 50 ksi.
 - 3. Protective Coating: In accordance with ASTM A653/A653M
 - a. Structural Framing: G90.
 - b. Interior Nonstructural Framing: G40.

1.11 ACCESSORIES

- A. General:
 - 1. Accessories including, but not limited to, clips, web stiffeners, resilient clips, and straps required for a complete and proper installation shall be of the type, size and gauge shown on the Drawings and specified in this Section.
- B. Wire: ASTM A641, Class 1 zinc coating, soft temper.
 - 1. Hanging Wire: 0.162-inch nominal diameter (8-gauge).
 - 2. Bracing Wire: Minimum 0.106-inch nominal diameter (12-gauge).
 - 3. Tie Wire:
 - a. Single Strand: Minimum 0.062-inch nominal diameter (16-gauge).
 - b. Double Strand: Minimum 0.048-inch nominal diameter (18-gauge).

1.12 FASTENERS

- A. Sheet Metal Screws: Steel self-drilling tapping, corrosion resistant, complying with ASTM C1513; “TEKS” screws” by ITW Buildex; screws in accordance with ICC ESR 1976, or equal.
 - 1. Screws shall be of sufficient size to insure strength of the connection.
 - a. For Attachment of Two Members with Maximum Material Less than 0.200 Inches: #10- 18x1/2” Tekes/2 panhead screws.
 - b. For Two Members with Maximum Material Less than 0.300 Inches: #10-16x3/4” Tekes/3 HWH.
 - 2. Corrosion-resistant coating shall comply with ASTM F1941.
 - 3. Head Style and Drive:
 - a. Typical: Pan-head Phillips.
 - b. Provide low-profile head type beneath sheathing and where required to accommodate level application of finish materials.

- B. Expansion Anchors:
 - 1. General:
 - a. Fabricate from corrosion-resistant materials with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing in accordance with ASTM E488/E488M conducted by a qualified independent testing agency.
 - b. Anchors shall be CBC compliant with a current ICC-ES Report.
 - c. All components of expansion anchor assembly shall be Type 304 stainless steel at exterior work.
 - 2. Types: Hilti Fastening Systems as specified, or equal.
 - a. Drilled-in Concrete Anchors: Hilti “Kwik Bolt TZ2”, ICC Report No. ESR-1917.
 - b. Provide periodic special inspections.

- C. Welding Electrodes: AWS A5.1/A5.1M E6013 Rods complying with, AWS A5.18/A5.18M.
- D. Touch-up Primer for Galvanized Surfaces: SSPC Paint 20 zinc rich; ZRC Cold Galvanizing Compound by ZRC Worldwide, International Protective Coatings, or equal.

1.13 FABRICATION

- A. Form members to manufacturer's standard shapes meeting design criteria.
- B. Cut right angle connections of framing components to fit squarely against abutting members.
- C. Prime un-galvanized steel to 1.5 mil (0.038 mm) minimum dry film thickness using specified zinc rich primer.

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SECTION 05 40 00**

PART 2 - EXECUTION

2.1 EXAMINATION

- A. Prior to installation of the work of this Section, carefully inspect and verify that installed work of all other grades is complete to the point where this installation may properly commence.
- B. Verify that specified items may be installed in accordance with the approved design.
- C. In event of discrepancy, immediately notify Contractor. Do not proceed in discrepant areas until discrepancies have been fully resolved.

2.2 ERECTION OF COLD-FORMED FRAMING

- A. General:
 - 1. Install framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and requirements specified and indicated on the Drawings.
 - 2. Fire-Rated Assemblies:
 - a. Comply with UL and local code requirements.
 - b. Use one manufacturer for each assembly, unless otherwise permitted by governing authorities.
- B. Join members by welding or with self-drilling, self-tapping screws; do not wire tie framing members.
 - 1. Weld connections by resistance spot or projection welding, fillet welding, or plug welding.
 - 2. Weld in accordance with the latest recommended procedures and practices of the American Welding Society.

2.3 FIELD QUALITY CONTROL

- A. The Owner's Testing Agency will:
 - 1. Provide inspection of welding, including prior fit-up, welding equipment, weld quality, and welder certification, in accordance with the CBC.
 - 2. Provide inspection during installation as required in order to establish conformity of work requirements.
- B. Maintain partitions in fully open position completely covered with protective materials until final acceptance by the Architect.

2.4 PROTECTION

- A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.
- B. In the event of damage, make repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

2.5 ADJUSTING

- A. Touch up field abrasions and welds and repair other damaged galvanized coating of structural framing with specified repair paint in accordance with ASTM A780/A780M, AGA publication, "Recommended Practice for Touch-up of Damaged Galvanized Coatings," and manufacturer's recommendations for application of repair paint.
- B. Work not in conformance with these Specifications and/or generally accepted standards of the trade, will be deemed defective by the Architect and will be rejected.
 - 1. Work that is defective shall be corrected.
 - 2. Corrections, redesign, and replacement of defective work shall be approved by the Architect and performed at Contractor's expense.
 - 3. Straightening of materials, if necessary, shall be done by a process and in a manner that will not injure the materials, and which is approved by the Architect. Sharp kinks or bends shall be cause for rejection. Heating will not be allowed.
- C. If defects or damaged work cannot be corrected in the field, the material shall be returned to the shop or new parts furnished, as the Architect directs; the Contractor shall replace all such work at his own expense.

2.6 FASTENING SCHEDULE

- A. Refer to information included on the Drawings.

END OF SECTION

**SECTION 05 50 00
METAL FABRICATIONS**

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated ferrous metal items, galvanized and prime painted.
- B. Stainless steel handrails.

1.02 RELATED SECTIONS

- A. Section 00 70 00: General Conditions.
- B. Section 09 91 00: Painting.
- C. Section 32 31 19: Decorative Metal Fences and Gates.

1.03 REFERENCES

- A. ASTM A36 / A36M-08 - Carbon Structural Steel.
- B. ASTM A53 / A53M-07 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- C. ASTM A123 / A123M-09 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- D. ASTM A283 / A283M-03 (2007) - Low and Intermediate Tensile Strength Carbon Steel Plates.
- E. ASTM A307-07b - Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- F. ASTM A924 / A924M-09a- General requirements for Steel Sheet, Metallic-Coated by the Hot-Dip process.
- G. ASTM A501-07 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- H. AWS A2.1 - Standard Welding Symbols.
- I. AWS D1.1 - Structural Welding Code.
- J. SSPC - Steel Structures Painting Council.
- K. CBC - California Building Code, 2022 Edition.

1.04 SUBMITTALS

- A. Submit under provisions of Section 00 33 00.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Provide specific submittal for all ramp and sloped walk guide rails, handrails, and guardrails prior to fabrication clearly showing spacing of rails and embed details.
- C. Indicate welded connections using standard AWS A2.1 welding symbols. Indicate net weld lengths.

1.05 QUALIFICATIONS

- A. Welders' Certificates: Submit under provisions of Section 01 33 00, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.06 FIELD MEASUREMENTS

- A. Field verify all dimensions prior to fabrication.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. General: All material that will be exposed must be smooth and free of surface blemishes including pitting, seam marks, roller marks, trade names and irregularities.
- B. Steel Sections: ASTM A36 / A36M-08.
- C. Steel Tubing: ASTM A500, Grade B.
- D. Stainless Steel Pipe: ASTM A312 heavy-wall .
- E. Pipe and Downspouts: ASTM A53 / A53M-07, Type E, Grade B.
- F. Plates: ASTM A36 / A36M-08.
- G. Bolts, Nuts, and Washers: ASTM A307-07b.
- H. Drilled-in Concrete Anchors: Hilti “Kwik Bolt TZ” (ICC Report No. ESR-1917), Ramset T3 (ICC Report No. ESR-1955), or accepted equal; stainless steel for all exterior work; testing required.
- I. Drilled-in Masonry Anchors: Hilti “Kwik Bolt 3” (ICC Report No. ESR-1385), Ramset T3 (ICC Report No. ESR-1955), or accepted equal; stainless steel for all exterior work; testing required.
- J. Welding Materials: AWS D1.1; type required for materials being welded.
- K. Shop and Touch-Up Primer: TNEMEC 10-99 - Red primer or Devco DEVGUARD 4141.
- L. Touch-Up Primer for Galvanized Surfaces: Zinc rich type.
- M. Metal Framing Channels: Channel members shall be fabricated from structural grade steel conforming to ASTM A924-09a; P1000 as manufactured by Unistrut or approved equal. Finish shall be hot-dip galvanized coating.
- N. Pipe/Conduit Clamps: Punch-press made from hot-rolled, pickled and oiled steel plates, strip or coil and conform to ASTM A36 / A36M-08; P2600 as manufactured by Unistrut or approved substitute. Finish shall be hot-dip galvanized coating.
- O. Non-Shrink Grout: Euco-Dry Pack Grout, natural aggregate, high strength non-shrink. “Pac-It” - W.R. Meadows, or approved equal.
- P. Removable Post Insert Sleeves: For mounting new posts/rails in new concrete, Wagner Companies EZ SLEEVE or equal. (888)243-6914.

2.02 FABRICATION

A. Workmanship

1. Form exposed work true to line and level with accurate angles and surfaces and straight, sharp edges.
2. Ease exposed edges to a radius of approximately 1/32 inch, unless indicated otherwise.
3. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing work.
4. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces. Welds to be imperceptible in finished work.
5. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible.

B. Assemblies

1. Use materials of sizes and thickness indicated or required to produce strength and durability in finished product for use intended.
2. Work to dimensions indicated.
3. Fit and shop assemble in largest practical sections for delivery to site.
4. Cut, reinforce, drill and tap miscellaneous metal work as required to receive finished hardware and similar items.
5. Exposed mechanical fasteners: When application will not permit concealed fasteners, locate exposed fasteners in unobtrusive manner, consistent with design of component, except where specifically noted otherwise. Use Phillips flat-head countersunk screws or bolts for exposed fasteners.
6. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
7. Fabricate joints exposed to the weather to be weather to be weather tight and provide weep holes as required.

C. Fit and shop assemble in largest practical sections, for delivery to site.

D. Fabricate items with joints tightly fitted and secured.

E. Continuously seal joined members by continuous welds.

- F. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- G. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- H. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FINISHES

- A. Prepare surfaces to be primed in accordance with SSPC SP 2.
- B. Prime all surfaces that are not scheduled to receive galvanization, except, do not prime surfaces embedded in concrete nor in areas of field welds until welds are completed and inspected.
- C. Prime paint items with one coat.
- D. Galvanize in accordance with ASTM A123 / A123M-09, designated steel items. Provide minimum 1.25 oz/sq ft galvanized coating.
- E. Stainless steel pipe shall have a light brushed satin 626 or similar finish.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components indicated on shop drawings.
- D. Perform field welding in accordance with AWS D1.1.

- E. Obtain Architect approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- G. At all welded and fabricated stainless steel pipe fabrications, miter weld and grind smooth all joints and finish to pipes standard 626 similar satin brushed finish.

3.04 SCHEDULE

- A. The Schedule is a list of principal items only. Refer to Drawing details for items not specifically scheduled.
 - 1. Steel pipe railing, (galvanized at exterior, primed at interior).
 - 2. Stainless steel pipe handrails, heavy-wall, 626 satin finish, diameter as indicated on the drawings.
 - 3. Pipe rail wall support brackets, (galvanized at exterior, primed at interior).
 - 4. Steel pipe downspouts and downspout support brackets, galvanized.
 - 5. Unistrut P-1000 Support System.

END OF SECTION

SECTION 06 06 60
TRANSLUCENT RESIN PANEL SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the Plastic Fabrication as shown and specified in the described system(s):
1. Wall Panels with stand-off system.
 2. Wall Panels-back-lit with stand-off system.
- B. Related Sections include the following:
1. Section 09 29 00: Gypsum Board.

1.3 SUBMITTALS

- A. General: Submit in accordance with Conditions of the Contract and Division 1 Specification sections.
- B. Product Data: Submit manufacturer's product data; include product description, fabrication information, and compliance with specified performance requirements.
- C. Submit product test reports from a qualified independent 3rd party testing agency indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of current products. Previously completed test reports will be acceptable if for current manufacturer and indicative of products used on this project.
1. Test reports required are:
 - a. Rate of Burning (ASTM D 635)
 - b. Self-Ignition Temperature (ASTM D 1929)
 - c. Density of Smoke (ASTM D 2843)
 - d. Flame Spread and Smoke Developed testing (ASTM E 84)
 - e. Room Corner Burn Test (NFPA 286)
 - f. Extent of Burning (UL 94)
 - g. Impact strength (ASTM D 3763)
 - h. Safety glazing impact resistance (ANSI Z97.1-2004)
 - i. UPIIT Test for Combustion Product Toxicity
 - j. Passes NFPA 269/ASTM1678 for Combustion Product Toxicity
 - k. Dynamic environmental testing (ASTM standards D 5116 or D 6670)
 - l. UL Yellowcard
- D. Building Approvals: Plastic Fabrications are to have been evaluated and must be registered with and comply to requirements of the following jurisdictions:
1. Los Angeles Department of Building and Safety (Product must have a LARR [Los Angeles Research Report] number) for use as Light-transmitting Panels
 2. ICC-ES Report for Light Transmitting Plastics and Interior Finishes

- E. Shop Drawings: Include plans, elevations, sections, panel dimensions, details, and attachments to other work.
- F. Samples for Initial Selection:
 - 1. Submit minimum 2-inch by 2-inch samples. Indicate full color, texture and pattern variation.
- G. Samples for Verification:
 - 1. Submit minimum 4-inch by 4-inch sample for each type, texture, pattern and color of solid plastic fabrication.
- H. Mockups:
 - 1. Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects.
 - 2. Build mockup of each type of Plastic Fabrication.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- I. Maintenance Data: Submit manufacturer's care and maintenance data, including care, repair and cleaning instructions. Include in Project closeout documents.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications

- 1. Materials and systems shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least five (5) consecutive years and which can show evidence of those materials being satisfactorily used on at least six (6) projects of similar size, scope and location. At least three (3) of the projects shall have been successful for use five (5) years or longer.
- 2. Manufactured panels must be produced from a minimum of 40% pre-consumer recycle content. This recycle content must be certified by a recognized 3rd party certification group, such as Scientific Certification Systems (SCS).
- 3. Completely PVC – Free product
- 4. Manufacturer must offer a documented reclaim process that will take back, at the manufacturers cost, panels that are at their end-of life cycle. Return process is preceded by following requirements highlighted in Section 02 42 00 Removal and Salvage of Construction Materials.
- 5. Manufacturer must have a 3rd party completed Life Cycle Analysis
- 6. Manufacturer must have an Environmental Product Declaration (EPD).

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver Plastic Fabrications, systems and specified items in manufacturer's standard protective packaging.
- B. Do not deliver Plastic Fabrications, system, components and accessories to Project site until areas are ready for installation.
- C. Store materials in a flat orientation in a dry place that is not exposed to exterior elements.
- D. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent damage or staining following installation for duration of project.

- E. Before installing Plastic Fabrications, permit them to reach room temperature.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install Solid Polymer Fabrications until spaces are enclosed and weatherproof, and ambient temperatures and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 WARRANTY

- A. Manufacturer's Special Warranty on Plastic Fabrications: Manufacturer's standard form agreeing to repair or replace units that fail in material or workmanship within the specified warranty period.
- B. Warranty Period: 1 year after the date of substantial completion.
- C. The warranty shall not deprive the owner of other rights or remedies the Owner may have under other provisions of the Contract Documents, and is in addition to and runs concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Manufacturer: 3form, LLC., Salt Lake City, Utah, USA / telephone 801-649-2500.
- B. Or approved equal.

2.2 MATERIALS

- A. Varia Sheet
 1. Engineered co-polyester resin produced in the USA.
 2. Sheet Size: Maximum 4 foot x 10 foot.
 3. Thickness: Minimum 1/2 inch.
 4. UV Protection: Required.
 5. Surface Finish: TBD from standard finishes selections.
 6. Basis of Design Product: Varia Stand-Off Wall Feature.
- B. Interlayer Materials: Compatible with polyesters and bonding process to create a monolithic sheet of material when complete. Interlayer material shall be chosen from manufacturer's full line of interlayers OR District provided artwork will be used.
- C. Sheet minimum performance attributes:
 1. Rate of Burning (ASTM D 635). Material must attain CC1 Rating for a nominal thickness of 1.5 mm (0.060 in.) and greater.
 2. Self-Ignition Temperature (ASTM D 1929). Material must have a Self-ignition temperature greater than 650°F.
 3. Density of Smoke (ASTM D 2843). Material must have a smoke density less than 75%.
 4. Flame spread and Smoke developed testing (ASTM E 84). Material must be able to meet a level of Class A (Flame spread less than 25 and smoke less than 450) at thickness of 1/8", 3/16" and 1".
 5. Room Corner Burn Test (NFPA 286). Material must meet Class A criteria at 1/4" (walls only) and 3/8" (walls only/standoffs only) thickness as described by the 2012 *International Building Code*.
 6. Extent of Burning (UL 94). Must submit UL card.

7. Impact strength. Minimum impact strength test as measured by ASTM D 3763 of 20 ft. lbs. (for durability, shipping, installation, and use).
8. Safety Glazing. Material must attain a Class A impact rating in accordance with ANSI Z97.1-2004 at 1/8" thickness.
9. UPIIT Test for Combustion Product Toxicity: Product must be recorded as "not more toxic than wood".
10. NFPA 269/ASTM 1678 test for toxicity: Product must have a best predicted LC₅₀ value ≤ 80.8 g/m³ Product must have a best predicted corrected for post-flashover conditions LC₅₀ value ≤ 19.0 g/m³
11. Dynamic environmental testing (ASTM standards D 5116 or D 6670). Panels must not have detectable VOC off-gassing agents and must be have Greenguard™ Indoor Air Quality Children and Schools certified.
12. Panels must be produced from a minimum of 40% pre-consumer recycle content. This recycle content must be certified by a recognized 3rd party certification group, such as Scientific Certification Systems (SCS).
13. Building Approvals: Plastic Fabrications are to have been evaluated and must be registered with and comply to requirements of the following jurisdictions:
 - a. New York Department of Buildings (Product must have an MEA [Materials and Equipment Acceptance] number) for use as Interior Finishes
 - b. Los Angeles Department of Building and Safety (Product must have a LARR [Los Angeles Research Report] number) for use as Light-transmitting Panels
 - c. ICC-ES Report for Interior Finishes and Light Transmitting plastics

D. STAND-OFF SYSTEM:

1. Provide 1 inch point support system which includes anchors for wood studs and/or hollow wall, 1 inch long milled stainless steel barrel, 1 inch stainless steel Standard Cap.
2. Provide eight stand-offs per panel. Where panels are notched or cut, provide an additional stand-off adjacent to these conditions in order to support outer corners.

2.3 FABRICATION

- A. General: Fabricate Plastic Fabrications to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes, profiles and other characteristics are indicated on the drawings.
- B. Comply with manufacturer's written recommendations for fabrication.
- C. Machining: Acceptable means of machining are listed below. Ensure that material is not chipped or warped by machining operations.
 1. Sawing: Select equipment and blades suitable for type of cut required.
 2. Drilling: Drills specifically designed for use with plastic products.
 3. Milling: Climb cut where possible.
 4. Routing
 5. Tapping
- D. Forming: Form products to shapes indicated using the appropriate method listed below. Comply with manufacturer's written instructions.
 1. Cold Bending
 2. Hot Bending
 3. Thermoforming: Acceptable only on uncoated material.
 4. Drape Forming

5. Matched Mold Forming
 6. Mechanical Forming
- E. Laminating: Laminate to substrates indicated using adhesives and techniques recommended by manufacturer.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide products of material, size, and shape required for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaner: Type recommended by manufacturer.
- C. Fasteners: Use screws designed specifically for plastics. Self-threading screws are acceptable for permanent installations. Provide threaded metal inserts for applications requiring frequent disassembly such as light fixtures.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where installation of Plastic Fabrications will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for installation and comply with requirements specified.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for the installation of Plastic Fabrications.
- B. Manufacturer's shop to fabricate items to the greatest degree possible.
- C. Utilize fasteners, adhesives and bonding agents recommended by manufacturer for type of installation indicated. Material that is chipped, warped, hazed or discolored as a result of installation or fabrication methods will be rejected.
- D. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
- E. Form field joints using manufacturer's recommended procedures. Locate seams in panels so that they are not directly in line with seams in substrates.

3.3 CLEANING AND PROTECTION

- A. Protect surfaces from damage until date of substantial completion. Repair work or replace damaged work, which cannot be repaired to Architect's satisfaction.

END OF SECTION

**SECTION 06 10 00
ROUGH CARPENTRY**

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Description of requirements for materials, fabrications and installation of rough carpentry and associated items (except that which is specified elsewhere) indicated on Drawings and necessary to complete the work. Items include, but are not necessarily limited to, the following:
 - 1. Blocking, Backing, Stripping, Furring, and Nailers.
 - 2. Rough Hardware.
 - 3. Wood Framing.
 - 4. Plywood Sheathing.
 - 5. Preservative Treatment.
 - 6. Metal Fabrications.

1.02 RELATED SECTIONS

- A. The Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 03 30 00: Cast-in-Place Concrete.
- C. Section 05 12 00: Structural Steel

1.03 QUALITY ASSURANCE

- A. Manufacturer data: Submit product data for all materials specified under this section and as applicable to each site.
- B. Coordinate the work of all trades to ensure proper placement of all materials, anchors, etc., as well as providing for openings and anchors for the installation of surface mounted materials and equipment.
- C. Qualifications of Workmen: Provide sufficient skilled workmen and supervisors who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of construction involved and the materials and techniques specified.
- D. Rejection: In the acceptance or rejection of rough carpentry, no allowance will be made for lack of skill on the part of the workmen.
- E. Requirements of Regulatory Agencies:
 - 1. California Building Code Standard, No. 23-1, "Classification, Definition and Methods in California of Grading all Species of Lumber":

- a. No. 23-2 - "Construction and Industrial Plywood".
 2. California Building Code, CBC 2022..
- F. References and Standards: Provide materials graded under latest Edition of the pertinent following Agencies:
1. American Society for Testing and Materials (ASTM).
 2. Lumber: West Coast Lumber Inspection Bureau (WCLIB), Rule 17, Standard Grading Rules for West Coast Lumber.
 3. Lumber: Western Wood Products Association (WWPA); Western Lumber Grading Rules.
 4. Plywood: American Plywood Association (APA) Plywood Specifications and Grades and Voluntary Product Standard DOC PS 1 "Construction and Industrial Plywood".
 5. Wood Preservative: American Wood Protection Association (AWPA), Standard U1.
 6. California Building Code, latest edition.
- G. Design Criteria: Pressure treatment shall not adversely affect application, permanence, or appearance of finish paint system.

1.04 SUBMITTALS

- A. Submit under provisions of Division 0, General Conditions.
- B. Certification:
 1. Pressure Treated Wood: Certification for water-borne preservative that moisture content was reduced to 19% maximum, after treatment.
 2. Pressure Treated Wood: Submit certification by treating plant stating the chemicals and process used, net amount of salts retained, and conformance with applicable standards.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protection, General: Protect wood from moisture while being stored and while work is in progress.
- B. Protection:
 1. After delivery, store all materials in such a manner as to ensure proper ventilation and drainage and to protect against damage and the weather.
 2. Keep all material clearly identified with all grade marks legible; keep all damaged material clearly identified as damaged, and separately store to prevent its inadvertent use. Do not allow installation of damaged or otherwise non-complying

material.

3. Use all means necessary to protect the installed work and materials of all other trades.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.06 JOB CONDITIONS

- A. Environmental Requirements: Maintain uniform moisture content of lumber at 19 percent or less prior to close-in.
- B. Sequencing: Coordinate details with other work supporting, adjoining, or fastening to rough carpentry work.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Wood:
 1. Lumber (Blocking, Backing, Stripping, Furring, and Nailers): WCLIB Construction.
 2. Lumber (Wood Framing): Meet requirements of following minimum grades, and as noted on Structural Drawings.

<u>Item</u>	<u>Species</u>	<u>Grade</u>	<u>Reference</u>
Studs	D.F.	No. 2 (2 x 4 Light Framing)	WCLIB 124
Studs	D.F.	No. 2 (2x6 & 2x8)	WCLIB 121
Plates	D.F.	No. 2 (2x, 3x, 4x)	WCLIB 123
Joists	D.F.	No. 1 (2x, 3x)	WCLIB 123
Beams	D.F.	No. 1 (4x)	WCLIB 123
Posts	D.F.	No. 1 (4x)	WCLIB 123
Beams	D.F.	No. 1 (6x)	WCLIB 130
Posts	D.F.	No. 1 (6x)	WCLIB 131

3. 3x and larger lumber shall be free of heart center.
4. 2x6 T & G Douglas Fir No. 1.
- B. Plywood:
 1. Roof and Wall Structural Sheathing: PS-1 Structural 1, CDX APA with exterior glue.
 2. Thickness and type shall be as indicated on Drawings.
- C. Pressure-Treated Lumber:
 1. Douglas Fir pressure-treated.
 - a. Required for cast-in-nailers, sills or anywhere wood is in contact with

- concrete, masonry or grout.
- b. Required for all rooftop blocking.

D. Preservative Treatment

1. Furnish pressure treated Douglas Fir in accordance with AWPA, Standard U1. Each piece is required to bear AWPA stamp.
2. Field treat cut edges and holes drilled in factory treated lumber with an approved AWPA Standard U1 preservative product.
3. For fastener requirements, see Paragraph 2.01-F-8.

E. Rough Hardware Fastenings and Connections: All types including bolts, lag screws, nails, spikes, screws, washers, framing devices and other rough hardware, or kinds that may be purchased and that require no further fabrication, shall be furnished and installed for all finish and rough carpentry. All exterior hardware shall be hot-dipped galvanized per ASTM A123 / A123M-09 Standards.

1. Nails: ASTM F1667 Common wire nails or spikes; box nails not permitted.
2. Wood Screws: Wood Screws: ANSI Standard B18.6.1; use galvanized type for exterior work.
3. Lag Screws: Conform to ASTM A307-07b and ANSI Standard B18.2.1. Dimensions and installation shall conform to requirements described in the National Design Specification (NDS), current edition.
4. Bolts: ASTM A307-07b, Grade A, hexagonal heads, unless noted otherwise.
5. Washers: Washers for bearing against wood shall be provided under all bolt heads and nuts. Washers shall be as indicated on Drawings.
6. Fabricated Sheet Metal Timber Framing Connectors: CBC approved. Fabricate from hot-dipped galvanized steel. Connectors shall be at least 18 gauge minimum material (1/8" plate materials where welded, unless otherwise noted), punched for nailing. Nails and Nailing shall conform to the manufacturer's instructions with a nail provided for each punched hole. Types as noted on Drawings, manufactured by Simpson Co. or approved substitute. All framing connectors shall be stamped with manufacturer's logo, and model designation.
7. All fasteners into preservative-treated and fire-retardant-treated wood shall be of hot dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper per CBC 2304.10.5. The coating weights for zinc-coated fasteners shall be in accordance with ASTM A 153. Fasteners other than nails, timber rivets, wood screws and lag screws shall be permitted to be of zinc coated steel with coating weights in accordance with ASTM B 695, Class 55 minimum.

F. Exterior Trim and Fascias: RIS Grade Stamped, Redwood, B Heart, Vertical Grain, Kiln Dried, surfaced sizes as indicated on the drawings.

2.02 FABRICATION

A. Lumber:

1. Air- or kiln-dry to maximum 19 percent moisture content, prior to and at time of installation. Lumber must be 19 percent moisture content prior to close-in and finish.
2. Furnish S4S unless otherwise noted.
3. Size to conform with rules of governing standard. Sizes shown are nominal unless otherwise noted.

2.03 SOURCE QUALITY CONTROL

- A. Grade Mark each piece of lumber. Marking must be done by recognized agency. Lumber Manufacturer's Association Certificates may be accepted in lieu of such grade and trademarks.
 1. Douglas Fir shall bear WCLIB grade stamp.
- B. Plywood Sheathing: Each panel shall be legibly identified as to type, grade and specie by APA grade. If plies are spliced, the slope of the scarf shall not be steeper than 1:8. White pockets will not be permitted in face plies.
- C. Each piece of preservative treated lumber shall bear AWPA stamp.

2.04 WOOD PRESERVATIVE TREATMENT

- A. Preservative treatment: Comply with applicable requirements of AWPA standards C2 for lumber and C9 for plywood. After treatment, kiln dry lumber to a maximum moisture content of 19 percent, and plywood to 15 percent.
 1. Pressure treat members connected with roofing, flashing and weatherproofing; including but not limited to cants, nailers, curbs, equipment supports and blocking.
 2. Pressure treat members that are concealed and in contact with masonry or concrete, including, but not limited to, sills, nailers, blocking, furring and studs.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection:
 1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly proceed.
 2. Verify that rough carpentry may be performed in strict accordance with the original design and all pertinent codes and regulations.
- B. Selection of Lumber Pieces: Carefully select all members. Select individual pieces so that knot and obvious defects will not interfere with placing bolts or proper nailing or making proper connections. Cut out and discard all defects which will render a piece unable to

serve its intended function.

- C. Lumber may be rejected by the Architect, whether or not it has been installed, for excessive warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting. No load carrying member shall be exposed to earthen materials.
- D. Shimming: Do not shim any framing component.

3.02 FASTENING

- A. Nailing: Except as otherwise indicated on Drawings or specified, all nailing shall be as scheduled on Drawings:
 - 1. Nails or Spikes shall be common wire unless noted otherwise. Penetration of nails or spikes shall be one-half the length of the nail or spike into the piece receiving the point. However, to connect pieces 2 inches in thickness, 16d nails shall be used unless noted otherwise.
 - a. Bore holes for nails wherever necessary to prevent splitting.
 - b. Use finish or casing nails for finish work.
 - c. Use of nailing guns is as limited by CBC and must be approved by Architect and DSA. Submittal of guns and nails is required.
- B. Bolts: Bolts shall be of sizes indicated. Drive fit with washers under nuts. Tighten all bolts and screws before closing in.
- C. Framing Devices: As specified under Products, sizes as indicated. Use half-length nails where required.
- D. Lag Screws: Pre-Bore lead holes and install per NDS, current edition.

3.03 FRAMING AND ROUGH CARPENTRY

- A. Sills: Shall be in long lengths of sizes shown, fastened with anchor bolts at exterior walls and with powder driven fasteners at interior walls as indicated, a minimum of two (2) fasteners per piece and a bolt within 9" but not nearer than 6" from end of piece. Place malleable iron or steel plate washers (but not cut washers) under nuts bearing on wood. Set sills level and true and bed exterior wall sills and interior bearing wall sills on 1/2 inch dry-pack or non-shrink grout.
- B. Studs, Posts and Columns: Shall be full length. Corners shall be as detailed. Partitions or walls containing plumbing, heating or other piping shall be so formed as to give proper clearance for materials. Cut members as required to provide full bearing at ends. Connect to structure as indicated.
- C. Plates: Shall be in long lengths and spliced as shown.
- D. Blocking: Shall be same thickness and width of studs or joists unless shown otherwise. Blocking shall not be spaced over 8'-0" o.c. Install fire blocking in accordance with CBC, Section 717. Install blocking at all plywood joints unless otherwise noted on the drawings. Install blocking for fastening all surface applied items.

- E. Joists and Beams: Shall be in long lengths and spliced over bearings unless shown otherwise. Install with crown side up. Beams or headers indicated to be built up of two or more joists shall be fabricated on the job using full length members. For two piece members, stitch nail pieces together with 16d common nails spaced not over 12" o.c. and staggered. Clinch nails protruding through members.
 - 1. Provide double joists and headers at all openings through floors and roofs unless otherwise shown on Drawings.
 - 2. Provide typical headers at all openings through walls where one or more studs are required to be cut. For penetration through walls narrower than stud spacing, provide solid backing on all sides for fastening finish materials.
- F. Plywood Structural Sheathing: Install to pattern indicated and provide blocking at all joints. Center all joints over bearing supports. Nail to framing as indicated. Install plywood with face plies perpendicular to joists or studs unless indicated otherwise.
- G. Wood Furring, Stripping and Grounds: Install as shown or required to provide nailing of materials or passage of pipes, conduits, etc., not otherwise accommodated.
- H. Bridging: Space not over 8'-0" o.c. for spans over 16'-0". Spans over 8'-0" and under 16'-0" shall have bridging placed at midspan. Bridging shall be two 2 x 3's or solid blocking as indicated. Joists 8" or less in depth shall not require bridging unless specifically indicated.
- I. Backing: Shall be provided for all wall and ceiling finishes and for supporting of fixtures and equipment for all trades, including toilet partitions, toilet room accessories, frames, case work, mirrors, trim, applied wall finishes, etc. Coordinate placement of backing and supports with manufacturer or supplier of mounted items.
- J. Cuts or holes in preservative treated wood shall be treated in accordance with AWPB standard M4 in the field.

3.04 MISCELLANEOUS HARDWARE

- A. All hardware indicated or required but not specified elsewhere shall be furnished and installed hereunder, including appropriate screws or other fastening devices.

3.05 MISCELLANEOUS CARPENTRY WORK

- A. Miscellaneous Carpentry Work not included under other sections shall be furnished and installed hereunder as indicated. Carefully locate and securely anchor such items to structure.
- B. Drypack: Drypack shall consist of 1-part high early strength Portland cement to not more than 3 parts of sand by volume. Add only a minimum amount of water to hold the mixture in shape while packing and to provide hydration. Solidly ram drypack into place to provide uniform bearing and cure with moist sacks or cloths for a period of at least three (3) days.
- C. Plywood Backing for electrical, telephone, and similar types of wall mounted equipment shall be provided hereunder where required. Plywood shall be 3/4" thick exterior A-C plywood with 'A' face exposed.
- D. Shoring and Bracing: Shore or brace for temporary support of all work as required during

the construction period except any shoring and bracing specified and included under other sections of these specifications.

- E. Temporary Enclosures: Provide and maintain all barricades and enclosures required to protect the work in progress.
- F. Protect all work in progress and all work installed, as well as the work of all other trades. Any work damaged as a result of the work under this section shall be corrected to its original condition or replaced if directed by the Architect and at no increase in cost to the Owner.
- G. Protection Devices: Pedestrian walkways, barricades, lights, shoring and other protective structures and devices necessary for the protection of pedestrians shall conform in all respects to the requirements of CBC, Section 3303 and to the requirements of the Department of Public Works.

3.06 FRAMING TOLERANCES

- A. Maximum variation from true flatness: 1/4 inch in ten feet in any direction.

3.07 CLEAN-UP

- A. Upon completion of the work of this Section, remove all surplus materials, rubbish and debris from the premises.

END OF SECTION 06 10 00

**SECTION 06 20 00
FINISH CARPENTRY**

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Finish Carpentry Items, Other Than Shop Fabricated Casework.
- B. Hardware and Attachment Accessories.

1.02 RELATED SECTIONS

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
- B. Section 06 10 00: Rough Carpentry.
- C. Section 09 90 00: Painting.
- D. Section 08 71 00: Door Hardware.

1.03 QUALITY ASSURANCE

- A. Standards of Construction: All work shall be manufactured in accordance with North American Architectural Woodwork Standards (NAWIS), latest edition, including all supplements and in the grades hereinafter specified.
- B. Installer's Qualifications: Use only journeymen finish carpenters who are thoroughly trained and experienced in the skills required for the cutting and fitting of trim and finish materials.
- C. Installation Acceptance: All rejected work shall be removed and replaced with no additional cost to the Owner.

1.04 SUBMITTALS

- A. General: Submit in accordance with Conditions of the Contract and Division 1 Specification sections.
- B. Shop Drawings: Shop drawings shall include details and erection data associated with the work of other trades; location; materials, species of wood; quality grade; type of finish; profiles, dimensions; fastenings and clearances. Detail drawings shall be either full size or three inches equals one foot (3" = 1').
 - 1. The mill shall take and be responsible for all field measurements required for the proper fabrication and installation of the work. Show all field dimensions beyond control of mill.
 - a. Report any major discrepancy between the Drawings and field dimensions to the Architect before fabrication of the work.

2. Coordinate dimensions and installation requirements of Owner furnished equipment.

C. Certification:

1. ~~Submit WI Certified Compliance certification covering all work of this Section prior to delivery of any materials to the job site.~~

2. Grade mark and mill identification of the association having jurisdiction shall appear distinctly legible on the back of each piece of lumber and plywood. No marks shall appear on exposed faces of work to receive transparent or semi-transparent finish.

D. Samples: Submit samples of all interior and exterior trim materials. Samples shall be finished as specified and submitted for color and material approval prior to delivery and installation.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Do not deliver material to site until required temperature and relative humidity conditions have been stabilized and will be maintained in installation areas.

B. Storage, Handling and Protection: Provide all work or materials necessary to store, cover and protect all materials specified to be furnished and installed under this Section. Store all materials under cover in a well-ventilated enclosure and protect against extreme changes in temperature and humidity. Avoid any marring and keep the materials clean during handling and installation operations. Protect exposed finish work and materials after their erection from damage of any character. Work damaged through neglect or failure to provide protection shall be repaired or replaced by the Contractor without additional cost to the Owner.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Wood Trim: Douglas Fir, surfaced, Kiln Dried, Opaque Finish.

B. Adhesives:

1. For Exterior Work: CS 35-61 Type I (fully waterproof). Shall withstand shear and cyclic boil tests specified in PS 51-71.

2. For Interior Work: CS 35-61 Type II (water-resistant). Shall withstand cold-soak tests specified in PS 51-71.

C. Fasteners:

1. Bright finish nails for interior work; aluminum or galvanized nails for exterior work. Screws shall be cadmium plated.

2. Lag Screws: Conform to ASTM A307. Dimensions and installation shall conform to requirements

described in the National Design Specification (NDS), 1991 Edition.

2.02 FABRICATION, GENERAL

- A. Moisture Content for all finish carpentry shall lay between 6 and 12 percent, consistent with the average atmospheric conditions at the project.
- B. Scribing Allowance: Provide at walls, ceilings, etc., in accordance with WI standards.
- C. Surfaces: Machine sanded on all flat top face areas, smoothly machine run in all depressed flat surfaces and on molded contours. Sander marks shall be fine enough to be completely concealed by the painter's applied finish work. All members shall be finished true and straight, with all edges clean cut and all exposed surfaces free from all working defects.
- D. Lengths shall be those regularly available in the species specified.
- E. Milling: All finish carpentry and millwork members shall be milled to dimensions and profiles indicated. Provide surface applied or plowed stops of the profile and dimension shown. Except where exact lengths can be determined, all members and materials shall be provided "long" for cutting and fitting in the field. Built-up members shall be fabricated as detailed and shall be carefully assembled to provide a finished product that is free from warp and defects and is true to line.
 - 1. Assemble in the mill in as large units as practicable to minimize field cutting and fitting. Where necessary to fit at the site, provide ample allowance for cutting and fitting.

PART 3 – EXECUTION

3.01 CONDITION OF SURFACES

- A. Examine all framing, grounds, stripping and blocking to secure finish carpentry and trim. Do not install finish carpentry and trim until all defects are corrected.

3.02 INSTALLATION

- A. Workmanship Quality: All wood finish shall be installed level, plumb and true, with members neatly and accurately scribed in place. All trim shall be applied in lengths as long as practicable. Butt joints shall be beveled together, exterior angles mitered, and interior angles coped, unless noted otherwise. All exposed nails and screws shall be set for putty unless indicated or specified otherwise.
- B. Wood Trim: Set plumb and square. Verify wall thickness for proper trim width. Anchor trim securely to structure to prevent rotation or damage. All wood trim installed in the field shall be carefully cut to length and all joints neatly made to provide for tight, rigid connections.
- C. Cementitious Siding: Install in strict conformance to the manufacturer's written installation instructions. Install over two layer of Grade "D" building paper. Caulk all butt joints and where product abuts trim or other surfaces.

3.03 MISCELLANEOUS

- A. Provide and install all miscellaneous finish carpentry items to conform to the workmanship quality specified above and shown on the Drawings. Millwork shall be installed in a neat, workmanlike manner, free of hammer marks and surface defects. Pieces shall fit together neatly with all corners mitered. Do not install finish carpentry until it has been backprimed as specified in Painting Section 09 90 00.

3.04 CLEAN-UP

- A. General: Keep the premises in a neat, safe and orderly condition at all times during execution of this portion of the work, free of accumulations of sawdust, cut-ends and debris.
- B. Clean-up: Upon completion of the work of this Section, remove all surplus materials, rubbish and debris from the premises and leave "broom clean".

END OF SECTION

SECTION 06 41 00
ARCHITECTURAL CASEWORK

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Special fabricated cabinet units.
2. Countertops.
3. Preparation for utilities.
4. Cabinet hardware.

B. Related Sections:

1. A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
2. 06 10 00 - Rough Carpentry.
3. 09 29 00 – Gypsum Board.

1.02 REFERENCES

- A. North American Architectural Woodwork Standards (NAAWS).
- B. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- C. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- D. ASTM C615 - Standard Specification for Granite Dimension Stone.
- E. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
- F. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

1.03 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01 33 00.
- B. Include materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes. Provide WI Certified Compliance label on first page of each set. Shop drawings will be rejected until reviewed by the assigned Woodwork Institute inspector and label has been issued.
- C. Product Data: Manufacture literature for all hardware to be provided.

D. Samples:

1. Finishes for color selection.
2. Hardware: drawer pulls, hinges, locks and other hardware accessories.
3. Identification tag and fasteners.
4. Submit two physical samples and product data sheets of drawer pulls, hinges, locks, ID tags, and other specified hardware accessories, illustrating hardware type and finish.

1.04 QUALITY ASSURANCE

- A. Manufacture casework items in accordance with quality standards of the NAAWS.
- B. All millwork and the installation of millwork shall be monitored for compliance under the scope of the WI Certified Compliance Program (CCP).
- C. Provide WI Inspection Service at the millwork fabricator. Provide to Architect a written report showing the results of the inspection.
- D. Issue WI Certified Compliance Certificate to Architect prior to delivery of millwork and provide WI Certified Compliance Labels on all items of casework and countertops.
- E. Provide WI Reinspection Service at the job site prior to installation. Provide to Architect a written report showing the results of the reinspection.
- F. Self-Certification by the millwork fabricator or inspection by other than an authorized representative of The Woodwork Institute is not acceptable.
- G. Upon completion of the installation, provide a WI Certified Compliance Certificate.
- H. Regulatory Requirements
 1. Conform to CBC requirements for flame spread classification.
 2. Conform to Flame Spread Classifications of Interior Millwork contained within the Appendix of the NAAWS for flame spread ratings as tested according to ASTM E84.
- I. Mockup
 1. Prepare mockup under provisions of Section 01 33 00.
 2. Provide full size base cabinet and upper cabinet of each type indicated, in specified finish with hardware installed.
 3. Units will be examined to ascertain quality and conformity to NAAWS.
 4. Units will establish a minimum standard of quality for this work.
 5. Approved units may be used as part of the Work.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage, and deter their erection from damage of any character. Work damages through neglect or failure to provide protection shall be made good by the contractor and without additional cost to the Owner.

1.06 FIELD MEASUREMENTS

- A. Verify that field measurements are as shown on shop drawings.
- B. Field verify existing finish floor conditions to ensure specified finish countertop heights and knee space clearances at accessible stations are maintained. If shimming is required to level units, this shall be taken into account in base cabinet construction.

1.07 COORDINATION

- A. Coordinate the work with electrical rough-in, to assure orderly and efficient sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. See schedule of manufacturers, patterns, and colors.
- B. Active member of the Woodwork Institute licensed by WI to provide WI Certified Compliance Certificates and Labels for the products and materials specified in this section www.woodworkinstitute.com.
- C. Substitutions: Under provisions of Section 01 25 13.

2.02 MATERIALS

- A. Individual cabinets are indicated on the drawings by the NAAWS Appendix Cabinet Design Series (CDS) numbering system.
- B. Wood materials shall be Forest Stewardship Council (FSC) certified.
- C. Composite wood shall be free of added urea formaldehyde.
- D. Modular Casework - Laminated Plastic Covered
 - 1. Fabricate in accordance with Section 10 of the NAAWS:
 - a. NAAWS Grade: Custom
 - b. Type: Type 1

- c. Construction: Style A-Frameless
- d. Joinery: Frameless
- e. Cabinet Backs: Dadoed (Detail 2C and 78 of Millwork Man.) Type A. Type B for glass
- f. Cabinet Door Type: Type A. Type B for glass
- g. Shelves:
 - All shelving less than 25" to be 3/4-inch-thick melamine covered Industrial Board.
 - All shelves between 25" to 34" to be 1" inch thick melamine covered Industrial Board.
 - All shelves between 34" to 46" to be 3/4" inch thick HPL covered Veneer Core DF Plywood.
 - All shelves over 46" to be 1" inch thick HPL covered Veneer Core DF Plywood.
- h. Shelf Edge Bands:
 - 1mm PVC in color to match shelf at three concealed sides. 3mm PVC at exposed leading edge.
- i. Door and Drawer Edge Bands:
 - 3 mm PVC radiused 1/8 inch at edge. Solid color as selected by Architect.
- j. Exposed Surfaces (including shelves and interior of open front cabinets):
 - .045-inch thick high pressure plastic laminate.
- k. Semi-Exposed Surfaces (behind doors and inside drawers):
 - Low pressure decorative polyester or melamine laminate ALA-85.
- l. Security and Dust Panels: Particle board, 3/4 inch thick at all lockable drawers.

E. Countertops - Laminated Plastic

1. Fabricate in accordance with Section 11 of the NAAWS:
 - a. NAAWS Grade: Premium
 - b. Core Thickness: .075 inch minimum
 - c. Laminate Thickness: 1.50 inch or .042 inch for postformed use
 - d. Edge Covering: --
 - e. Backsplash: Square butt
 - f. Top of Back Splash: Square self-edge
 - g. Colors and Pattern: To be selected by Designer

G. Hardware

- ~~1. Finish: Satin Aluminum.~~
- ~~2. Shelf Standards: Knappe and Vogt 255ZC (bright zinc plated).~~
- ~~3. Shelf Supports: Knappe and Vogt 256ZC (bright zinc plated).~~
- ~~4. Shelf Fastener Supports: Knappe and Vogt 243ZC (bright zinc plated) 2 each shelf.~~
- ~~5. Shelf Supports: Hettich "Sekura" or approved equal all metal construction with 80 lb load rating. Retention pins only required at front shelf support clips. Rear clips may be non-retention pin type. Clips set in drilled holes spaced 32 mm on center.~~
- ~~6. Drawer and Door Pulls: 5 inch Epcor 'U-shaped' wire pulls, Hafele, or approved equal. Pulls shall comply with CCR Section 11178.6(4) and 11258.4.~~
- ~~7. Cabinet Locks: National Lock C8123, Corbin 0737, K and V 986, or equal. Install on all cases unless otherwise noted.~~
- ~~8. Drawer Slides for Drawers 24 inch Wide or Less: Accuride 7432.~~
- ~~9. Drawer Slides for Drawers over 24 inch wide: Accuride 3640.~~

10. ~~Drawer slides for File Drawers: Grant No. 329 heavy duty ball bearing full extension slides with 100 lbs. capacity at large flat file drawers use Accuride No. 3640, 200 lbs., full extension, ball bearing, rail mount slides.~~
11. ~~Hinges: Rockford Process Control, No. 851, heavy duty wrap-around, tight pin butts of steel, 2-3/4 inch minimum width with companion magnetic door catch capable of a minimum 10 pound pull capacity. Hinges per leaf: 3 feet 0 inch high doors – two (2) hinges, 3 feet 0 inch to 5 feet 0 inch high doors – three (3) hinges, 5 feet 0 inch to 7 feet 4 inch high doors – four (4) hinges, 7 feet 0 inch to 8 feet 0 inch – five (5) hinges.~~
12. ~~Magnetic Door Catch: Ives 326, or Hafele 246.43 .758.~~
13. ~~Sliding Door Track Assemblies: Grant 2023N sheaves and Grant 2011 track.~~
14. ~~Grommets: Hafele No. 429.99.128, 3-inch diameter or as noted on drawings.~~
15. ~~Seismic Shelf Lip: 1/4 inch thick by 3 inch high acrylic plastic or PVC edging of color selected by Architect. Ease all edges of plastic.~~
16. ~~Remainder of hardware required shall be as listed in the Hardware Supplement to Sections 14 and 15 of the Manual of Millwork.~~
17. ~~Substitutions: Under the provisions of Section 01 25 13.~~

2.08 FABRICATION

- A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.
- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- C. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal contact surfaces of cut edges.
- D. Provide all supports and required inserts for laboratory type sink units.
- E. Install plastic grommets in the field in plastic laminate casework and Owner furnished furniture as directed by the Owner's Representative and/or Architect.
- F. Install seismic shelf lips on all exposed edges of open laboratory shelving with flathead countersunk wood screws spaced 6 inches on center. Finish exposed screw heads to match color of shelf lip.
- G. Install one (1) adjustable shelf for each 1 foot 0 inch of height for all wall mounted cabinets.
- H. Provide stretcher at top face of all door and drawer fronts.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Verify adequacy of backing and support framing.

3.02 INSTALLATION

- A. Set and secure casework in place rigid, plumb, and level.
- B. Install casework in accordance with Section 10 and the Appendix of the NAAWS.

3.03 ADJUSTING AND CLEANING

- A. Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly and correctly.
- B. Clean casework, counters, shelves, hardware, fittings and fixtures.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 – GENERAL

1.02 SUMMARY

A. SECTION INCLUDES

1. Sound Insulation.

B. RELATED WORK SPECIFIED ELSEWHERE

1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
2. Section 05 12 00: Structural Steel.
3. Section 06 10 00: Rough Carpentry.

C. REFERENCES:

1. CBC, California Building Code - 2022 Edition, as amended.
2. California Quality Standards for Insulating Materials.

1.02 SUBMITTALS:

A. Submit the following items in accordance with Divisions 00 & 01:

1. List of materials.
2. Product data for each type of insulation specified.
3. Insulation Certificate: Installer shall submit a copy to the Architect and post in a conspicuous location in each building a certificate signed by the installer and the General Contractor stating that the installation conforms with the requirements of CBC 2022 edition, Title 24, Chapter 2–53, and that the materials installed conform with the requirements of the California Quality Standards for Insulating Materials. The certificate shall state the manufacturer's name and material identification and the installed "R" value. Submittal required.
4. Provide color-coated floor plan showing stud depth and necessary batt insulation to fill cavity.

1.03 DELIVERY, STORAGE AND HANDLING:

- A. Deliver materials to the job site and store in a safe dry place with all labels intact and legible at time of installation.
- B. Protect building insulation materials before installation and protect the installed work and materials of other trades.
- C. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Johns-Manville.
- B. Owens–Corning Fiberglass Corporation
- C. Celotex Corporation
- D. CertainTeed Corporation.
- E. USG Thermafiber (at fire rated construction assemblies where required by listed Design Number).
- F. Approved equal.

2.02 MATERIALS:

- A. **Type A**, Sound Insulation: A batt-like non-combustible, formaldehyde free product manufactured from inorganic fibers for installation in framed wall cavities. The nominal 16 inch, or as required x 96 inch batts shall be un-faced.
 - 1. Un-faced insulation shall comply with ASTM C-665, Type I. Provide fire rated type insulation at all rated walls to receive insulation.
 - 2. Product Fire Hazard Classification Rating as required by the specified codes and standards for use at locations and conditions indicated.
 - 3. Thickness: As required to fill full depth of wall cavity.
 - 4. Flame Spread = 25, Smoke Developed = 50.
 - 5. Use at ALL interior partial height framed walls.

2.03 MISCELLANEOUS MATERIALS:

- A. All other materials, such as additional insulation materials, fasteners, line wire, tape and retainers, not specifically described but required for a complete and proper installation of building insulation, shall be subject to submittal approvals.
 - 1. Provide additional insulation materials selected from manufacturer's standard materials. These materials shall conform to the specified Codes, Standards and performance requirements as indicated in the Contract Documents or as required for the complete and proper construction of the building envelope.

PART 3 – EXECUTION

3.01 INSPECTION:

- A. Prior to all work of this Section, carefully inspect and verify that the installed work of all other trades is complete to the point where this installation may begin.
- B. In the event of discrepancy, immediately notify the Architect. Do not proceed with installation in discrepant areas until all such discrepancies have been fully resolved.

3.02 INSTALLATION:

- A. Batt, Blanket Insulation: Provide insulation barrier system with no voids in system. Keep end joints to a minimum. Install with vapor barrier to warm (interior) side. Fit ends and edges tight to framing members. Keep all piping and other work on warm side of insulation. Provide tape vapor barrier joints. Tape as required.

3.03 PROTECTION:

- A. Protect installed insulation from damage until covered.

END OF SECTION

SECTION 07 90 00
JOINT SEALERS

PART 1 – GENERAL

1.01 SUMMARY

A. SECTION INCLUDE

1. Preparing sealant substrate surfaces.
2. Sealant and sealant backing for materials.

B. RELATED SECTIONS

1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
6. Section 08 11 16: Aluminum Entrance Doors.
7. Section 09 29 00: Gypsum Board Systems.
8. Division 22: Mechanical.
9. Division 26: Electrical.

C. REFERENCES

1. ASTM C834 Standard Specification for Latex Sealants.
2. ASTM C920 Standard Specification for Elastomeric Joint Sealants.
3. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
4. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials.
5. ASTM E814 Standard Test Method for Fire Tests of Penetration Firestop Systems.
6. FM (Factory Mutual) - Fire Hazard Classifications.
7. UL - Fire Hazard Classifications.
8. UL 263 - Standard for Fire Tests of Building Construction and Materials.
9. UL 723 - Test for Surface Burning Characteristics of Building Materials.
10. FS TT S 00227 - Sealing Compound: Elastomeric Type, Multi-Component.
11. FS TT S 00230 - Sealing Compound: Elastomeric Type, Single Component.
12. FS TT S 001543 - Sealing Compound, Silicone Rubber Base.

1.02 SUBMITTALS

- A. Submit manufacturer's product data under provisions of Section 01 33 00 for each product required.
- B. Submit product data indicating sealant chemical characteristics, performance criteria, limitations, and color availability.
- C. Submit samples under provisions of Section 01 33 00.
- D. Submit standard color ranges of exposed materials for Architect selection.

- E. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

1.03 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years' experience.
- B. Applicator: Company specializing in applying the work of this section with minimum three years' experience, with projects of a similar size and type.
- C. Conform to Sealant Waterproofing and Restoration Institute requirements for materials and installation.
- D. Prior to installation of joint sealants, field test adhesion to joint substrates.
 - 1. Install joint sealants in 5-foot joint lengths. Allow to cure before testing. Test adhesion by pulling sealant out of joint.
 - 2. Perform field tests for each type of elastomeric sealant and joint substrate.
 - 3. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
 - 4. Report whether or not sealant in joint connected to pulled out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
 - 5. Sealants not evidencing adhesive failure from testing, in absence of other indications of non-compliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrate during testing.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Do not install solvent curing sealants in enclosed building spaces.
- B. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.
- C. Do not install sealants under adverse weather conditions or when temperatures are above or below manufacturer's recommended limitations for installation.
- D. Deliver materials in the unopened, original containers or unopened packages with manufacturer's name, labels, product identification, color, expiration period, curing time and mixing instructions for multi-component materials.

1.05 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with all Sections referencing this Section.

1.06 WARRANTY

- A. Provide two-year warranty for materials and workmanship under provisions of Section 01 33 00.
- B. Warranty: Include coverage of installed sealants and accessories which fail to achieve airtight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 – PRODUCTS

2.01 SEALANTS

- A. Silicone Sealant: Silicone Sealant (use at concrete, masonry, or glazing applications): FS TT S 01543, Class A, low modulus type; Spectrum I as manufactured by Tremco, Inc.
- B. Interior Building Sealant: Acrylic-emulsion; one-part, non-sag, mildew-resistant. Complying with ASTM C834, formulated to be paintable; Pecora Corp. "AC-20", Sonneborn "Sonolac", Tremco Inc. "Tremco Acrylic Latex 834" or approved equal.
- C. Acoustical Sealant for Concealed Joints: Nondrying, nonhardening, non-skinning, non-staining, gun-able, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound; Pecora Corp. "BA-98", Tremco Inc. "Tremco Acoustical Sealant" or approved equal.
- D. Acoustical Sealant for Exposed Joints: Nonoxidizing, skin-able, paintable, gun-able sealant recommended for sealing interior exposed joints to reduce transmission of airborne sound; Pecora Corp. "AC-20", USG "Sheetrock Acoustical Sealant" or approved equal.
- E. Vertical Building Expansion Joints: Joint sealing material shall be a one-component, polyurethane-based non-sag elastomeric sealant. Product shall be Sikaflex Construction Sealant as manufactured Sika Corporation, Pecora Corp. "DynaTrol II" or approved equal. Color shall be chosen from the full range of manufacturer's standard colors.
- F. Substitutions: Under provisions of Section 01 33 00.
- G. Color of sealant shall be as selected by Architect.

2.02 ACCESSORIES

- A. Primer: Non staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Noncorrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Non-staining; compatible with sealant and primer; such as round, closed cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width. Materials impregnated with oil, bitumen or similar materials shall not be used. Sealant shall not adhere to back-up material.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

- E. Solvents: cleaning agents or other accessory materials shall be as recommended by the sealant manufacturer.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and joint openings are ready to receive work and field measurements are as shown on Drawings and recommended by the manufacturer.
- B. Beginning of installation means installer accepts existing surfaces.

3.02 PREPARATION

- A. Clean and prime joints in accordance with manufacturer's instructions.
- B. Remove loose materials and foreign matter which might impair adhesion of sealant.
- C. Verify that joint backing and release tapes are compatible with sealant.
- D. Perform preparation in accordance with sealant manufacturer's recommendations.
- E. Protect elements surrounding the work of this Section from damage or disfiguration.
- F. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or acid washing to produce a clean, sound substrate. Remove loose particles remaining from cleaning operations by vacuuming or blowing out joints.
- G. Clean metal, glass, glazed surfaces of ceramic tile and other non-porous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealants.

3.03 INSTALLATION

- A. Install sealant in accordance with manufacturer's instructions.
- B. Caulk all exterior joints and openings in the building envelope that are observable sources of air infiltration.
- C. Measure joint dimensions and size materials to achieve required width/depth ratios.
- D. Install joint backing to achieve a neck dimension no greater than 1/3 the joint width. Roll the material into the joint to avoid lengthwise stretching. Do not twist or braid rod stock.
- E. Install bond breaker where joint backing is not used.
- F. Prime surfaces to receive joint sealant with primer recommended by sealant manufacturer.

- G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges. Apply masking tape where required to protect adjacent surfaces from sealant application.
- H. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- I. Tool joints concave.
- J. At all surface-mounted light fixtures mounted on gypsum board ceilings, contractor shall caulk light fixture body to ceiling finish to eliminate gap between metal body and fixture. Coordinate locations with drawings.

3.04 CLEANING AND REPAIRING

- A. Clean work under provisions of Section 01 77 00.
- B. Clean adjacent soiled surfaces. Use a solvent or cleaning agent as recommended by the sealant manufacturer.
- C. Repair or replace defaced or disfigured finishes caused by work of this Section.

3.05 PROTECTION OF FINISHED WORK

- A. Protect finished installation under provisions of Section 01 66 00.
- B. Protect sealants until cured.
- C. Do not paint sealants until sealant is fully cured.
- D. Do not paint silicone sealant.

END OF SECTION 07 90 00

SECTION 08 11 00
METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Includes:

1. Non-rated and fire rated rolled steel doors, panels, and frames.
2. Door Vent Louvers.

B. Referenced Sections:

1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
5. Section 08 71 00: Door Hardware.
6. Section 08 80 00: Glazing.
7. Division 28: Access Control.

1.02 REFERENCES

- A. ANSI A250 .8 – Recommended Specification for Standard Steel Doors and Frames.
- B. ANSI A250.3 - Test Procedure and Acceptance Criteria for Factory-Applied Finish Painted Steel Surfaces for Steel Doors and Frames.
- C. ANSI A250 .10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
- D. ASTM A653 - Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot- Dip Process.
- E. ASTM A924 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized} by the Hot-Dip Process.
- F. CEC - California Energy Commission.
- G. NFPA 80 - Fire Doors and Windows.
- H. SDI-105 - Recommended Erection Instructions for Steel Frames.
- I. DHI - Door and Hardware Institute.
- J. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2 and Part 6.

K. UL 9 - Fire Tests of Window Assemblies.

L. UL 10C - Fire Tests of Door Assemblies.

1.03 QUALITY ASSURANCE

A. Conform to requirements of ANSI A250.8.

B. Fire rated door, panel and frame construction to conform to UL 9 and UL 10C.

C. Installed frame and door assembly to conform to NFPA 80 for fire rated class indicated on Drawings.

D. Installed exterior frame and door assembly to be weather tight

E. Manufacturer shall have both fabrication and assembly plant located within the continental United States or Canada. Products that are either fabricated or assembled outside the continental United States or Canada are not acceptable.

1.04 SYSTEM REQUIREMENTS

A. Performance Requirements

1. Thermal Performance: Glazed exterior borrowed lite, side lite and transom lite frames shall have an overall minimum u-value of 1.19 as rated in accordance with the default table method approved by the California Energy Commission (CEC). Provide Label Certificate FC-1, Figure 3-3, from the Nonresidential Compliance Manual documenting compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, Section 116, Table 116-A.
2. Solar Heat Gain Coefficient: Glazed exterior borrowed lite, side lite and transom lite frames shall have an overall maximum solar heat gain coefficient of 0.68 as rated in accordance with default table method approved by the California Energy Commission (CEC). Provide Label Certificate FC-1, Figure 3-3, from the Nonresidential Compliance Manual documenting compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, Section 116, Table 116-B.

A. Regulatory Requirements

1. Conform to CBC 2022, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2 for fire rated frames and doors.
2. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, for u- value and solar heat gain coefficient.

1.05 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01 33 00.

B. Indicate frame configuration, anchor types and spacings, location of cutouts for hardware, reinforcement, and finish.

- C. Indicate door elevations, internal reinforcement, closure method, and cut outs for glazing and louvers.
- D. Submit two (2) samples of exterior frame profile at mullion intersection.
- E. Submit Label Certificate FC-1, Figure 3-3, from the Nonresidential Compliance Manual documenting compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, Section 116, Table 116-A and 116-8.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect, and handle products under provisions of Section 016200.
- B. Store products on site under cover.
- C. Place products on at least 4-inch wood sills to prevent rust and damage.
- D. Protect doors and frames with resilient packaging.

1.08 SEQUENCING AND SCHEDULING

- A. Sequence work under the provisions of Section 01 32 13.
- B. Schedule work under the provisions of Section 01 32 13.
- C. Schedule delivery of all doors and frames so as not to delay progress of other trades.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Curries Mfg. Inc., www.curries.com - 747 series (specified).
- B. Amweld Building Products, Inc., www.amweld.com.
- C. Door Components, Inc., www.doorcomponents.com.
- D. Fleming, www.flemingdoor.com.
- E. Krieger Steel Products Company, www.kriegersteel.com.
- F. Republic Builders Products Corporation, www.republicdoor.com.
- G. Ceco, www.cecodoor.com.
- H. Substitutions: Under provisions of Section 01 25 13.

2.02 MATERIALS

A. Doors, Panels and Frames

1. Steel: Commercial quality cold rolled steel conforming to ASTM A653 galvanized to A60 or G60 coating class or Type 8, A40 (ZF120) according to ASTM A924 with minimized spangle, mill phosphatized.
3. Interior Doors: ANSI A250.8, Level 2 heavy duty, Model 1, minimum 0.042-inch-thick faces (18 GA. Minimum).
5. Interior Frames: ANSI A250 .8, Level 2, 0.053-inch-thick material (16 GA. Minimum), core thickness.
6. Panels: Same materials and construction as specified for doors.

B. Door Core

2. Interior Door Core: Impregnated cardboard honeycomb.

C. Closer Channels

1. Close top and bottom edge of exterior door flush with inverted steel channel closure. Weld all joints watertight.

D. Frame Anchors

3. Wood Stud Anchor: U shaped anchor, welded to frame, 1 inch wide, 0.053-inch-thick steel, with 2 pre-punched holes in nailing flange. UL listed as required for fire rating.
5. Floor Clip: Angle anchor, full width of frame, 0.067-inch-thick steel.

E. Protective Coatings

1. Bituminous Coating: Fibered asphalt-based corrosion proofing and sound deadener compound. Equivalent to Transcoat 101-F, www.oilservice.com.
2. Primer: Clean and treat with three stage iron phosphate process. Provide baked-on shop coat of EPA compliant gray synthetic rust - inhibitive enamel primer meeting acceptance criteria of ANSI 250.10.

F. Hardware Reinforcement

1. Fabricate frames and doors with hardware reinforcement plates welded in place.
2. Hinge reinforcing shall be full width of frame profile.
3. Provide spacers for all thru-bolted hardware.
4. Reinforcement components shall be the following minimum thickness:
5. Hinge (door and frame) 3/16 inch
6. Mortise Lock or Deadbolt 0.093 inch
7. Bored Lock or Deadbolt 0.093 inch
8. Flush Bolt Front 0.093 inch

9. Surface Bolt	0.093 inch
10. Surface Applied Closer	0.093 inch
11. Hold Open Arm	0.093 inch
12. Pull Plates and Bars	0.067 inch
13. Surface Exit Device	0.093 inch
14. Floor Checking Hinge	0.167 inch
15. Pivot Hinge	0.167 inch

G. Sound Transmission Coefficient (STC): 43 or better.

2.03 ACCESSORIES

A. Door Vision Lites: 20-gauge galvanized frame, grey primer, field painted. Size as shown on Drawings.

1. Anemostat security door louvers, model #LoPro.
2. Or approved equal.

B. Rubber Silencers: Provided by Section 08 71 00. Coordinate installation.

C. Glazing Stops: Rolled steel channel shape, mitered corners; prepared for countersink style tamperproof screws at door installations, square butt at light frames.

2.03 FABRICATION

A. When shipping limitations so dictate, frames for large openings shall be fabricated in sections designed for splicing.

B. All spliced joints shall occur on the interior side of exterior frames.

C. Fabricate frames as full profile welded units.

D. All face, rabbet and soffit joints between abutting members shall be continuously welded and finished smooth when exposed to exterior.

E. Corner joints shall have all contact edges closed tight, with faces mitered and continuously welded.

F. Frames with multiple openings shall have mullion members fabricated with no visible seams or joints. All face, rabbet and soffit joints between abutted members shall be continuously welded and finished smooth when exposed to exterior.

G. Provide 3/8-inch back bend return on frames where gypsum board wall material occurs whether on one or both sides.

I. Dust cover boxes or mortar guards of 0.016-inch-thick steel shall be provided at all hardware mortises on frames.

- J. Reinforce frames wider than 48 inches with roll formed, 0.093-inch-thick steel channels fitted tightly and welded into frame head, inverted U-shape profile.
- K. Prepare frame for silencers except for frames which receive weatherstripping. Provide three (3) single rubber silencers for single doors on strike side, and two (2) single silencers on frame head at double doors without mullions.
- L. Provide steel spreader temporarily attached to feet of both jambs as a brace during shipping and handling. Spreader is not to be used for installation purposes.
- M. Attach fire rated label to each frame and door unit.
- O. Manufacturing Tolerances
 - 1. Manufacturing tolerance shall be maintained within the following limits:
 - 2. Frame width +1/16 inch -1/32 inch
 - 3. Frame height +3/64 inch
 - 4. Frame face +1/32 inch
 - 5. Frame stop +1/32 inch
 - 6. Frame rabbet +1/64 inch
 - 7. Frame depth +1/32 inch
 - 8. Frame throat +1/16 inch
 - 9. Door width and height +3/64 inch
 - 10. Door thickness +1/16 inch
 - 11. Hardware location +1/32 inch
 - 12. Door flatness +1/16 inch
- P. Doors shall be prepped and cored for access control wiring. Contractor shall carefully coordinate with Division 28 requirements for placement of preps/cores from electric hinge preps from lever or panic devices.

2.4 FINISHES

- A. Primer: Baked on rust-inhibitive enamel.
- B. Finish: Site paint under provisions of Section 09 91 00.
- C. Coat inside of frame profile for frames installed in masonry construction with bituminous coating to a thickness of 1/16 inch. Coating may be factory or site applied. Do not apply coating to fire rated frames.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install frames in accordance with SDI-105.

- B. Install doors in accordance with DHI.
- C. Install fire doors and frames in accordance with NFPA 80.
- D. Installation of exterior doors and frames to be weathertight and waterproof.
- E. Seal penetration of all surface applied screws on exterior face of frames at glass stops and hardware attachments.
- F. Coordinate with wall construction and details for anchor placement. Provide anchors as follows:
- G. Frames up to 7 feet 6 inches height - 4 anchors each jamb.
- H. Frames 7 feet 6 inches to 8 feet 0-inch height - 5 anchors each jamb, plus an additional anchor for each 2 feet or fraction thereof over 8 feet 0 inch.
- I. Frames for double doors; minimum of two (2) anchors in head approximately 12 inches from each jamb.
- J. Borrowed lite frames; two (2) anchors each jamb plus 1 for each 18 inches or fraction thereof over 3 feet 0 inch. Minimum two (2) anchors in head and sill approximately 12 inches from each jamb plus 1 for each 30 inches of length or fraction thereof.
- K. Floor anchors - one (1) anchor each jamb for interior doors. Where wall construction will not allow placement of floor anchor, provide one (1) additional jamb anchor as close to floor as possible.
- L. Existing wall anchors shall be welded to provide non-removable condition. Welded bolt head to be ground, dressed and finished smooth.
- M. Frames installed in masonry walls to be fully grouted with masonry grout.
- N. Exposed field welds to be finished smooth and touched up.
- O. Primed or painted surfaces which are scratched or marred shall be touched up.
- P. Hardware to be applied in accordance with hardware manufacturer's templates and instructions.
- Q. Coordinate installation of glass and glazing.
- R. Install door louvers.
- S. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

3.02 CONSTRUCTION

A. INSTALLATION TOLERANCES

1. Edge clearance for swinging doors shall not exceed the following:
 - a. Between door and frame at head and jamb: 1/8 inch.
 - b. Between edge of pair of doors: 1/8 inch.
 - c. At door sill with threshold. (From bottom of door to top of threshold): 3/8 inch.
 - d. At door sill with no threshold: 1/2 inch.
 - e. At door bottom and rigid floor covering per NFPA 80: 1/2 inch.
 - f. At door bottom and nominal floor covering per NFPA 80: 5/8 inch.

2. Frame installation tolerance shall not exceed the following:
 - a. Squareness $\pm 1/16$ inch.
 - b. Alignment $\pm 1/16$ inch.
 - c. Plumbness $\pm 1/16$ inch.
 - d. Diagonal Distortion $\pm 1/32$ inch.

END OF SECTION 08 11 00

SECTION 08 31 00
ACCESS DOORS AND PANELS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Steel access panels, except those specified under Divisions 22 - Plumbing, 23 - HVAC, or 26 - Electrical.

B. Related Sections:

1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
2. Section 05 40 00: Cold Formed Metal Framing.
4. Section 09 29 00: Gypsum Board.
6. Section 09 91 00: Painting.
7. Division 26: Electrical.
8. Division 27: Communications.

1.02 SUBMITTALS

A. Shop Drawings:

1. Indicate sizes, materials, thickness, fabrication methods, panel door and frame reinforcement, anchorage, and installation details.
2. Provide layout drawings, indicating dimensioned locations of proposed access panels, size of each panel, and installation details. Determine and indicate required access panels in finished surfaces, whether furnished under this section or as part of Work of Divisions 22-Plumbing, 23-HVAC, and 26- Electrical.

1.03 QUALITY ASSURANCE

- A. Panels shall be provided with UL listings and labels.
- B. Access panels and frames shall be products of one (1) manufacturer.
- C. Coordinate access panels with plumbing, HVAC, and electrical work.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Panels and Frames: Provide protection as required by manufacturer to protect panels from damage during storage.

PART 2 – PRODUCTS**2.01 MATERIALS****A. Access Panels:**

<u>Non-Rated</u>	<u>Milcor</u>	<u>Karp</u>	<u>Nystrom</u>
Ceramic Tile	MS	DSC214M	NT
Plaster	K	DSC214M	NP
Drywall, Plaster Veneer	DW	DSC214M	NW
<u>Fire-Rated</u>	<u>Milcor</u>	<u>Karp</u>	<u>Nystrom</u>
Ceramic Tile	MS	KRP150FR	IT
Plaster	M	KRP150PR	IP
Drywall, Plaster Veneer	M	KRP150FR	IW

B. Or approved equal.

C. Unless otherwise indicated, provide prime coat finish suitable for field painting for panels installed in gypsum board finishes.

D. Access Panels shall be 18 gauge minimum with vandal-proof lock operated by Allen wrench or another special tool. Exposed fastenings shall be secured with vandal-proof screws.

E. Ceiling Access Doors.

1. Provide exterior type single-door by Dur-Red Products, Model TCA, 30 inches by 36 inches in size.
 - a. Door Leaf: 1-inch-thick core rigid fiberglass with 20-gauge steel outer shell.
 - b. Finish: Primer grey and painted minimum two (2) coats of paint. Color to match adjacent ceiling color finish.
2. Install ceiling access door where access to the enclosed attic spaces is required and/or as shown in the drawings. If not shown in the drawings, provide one ceiling access panel in each enclosed drywall ceiling room. Where ceiling is rated, the ceiling access door shall meet or exceed the rating of the ceiling. All ceiling access doors shall receive keyed locks.

PART 3 – EXECUTION**3.01 GENERAL**

- A. Provide access panels in finish construction, where indicated on Drawings, wherever required for access to concealed mechanical and electrical equipment, and where required by codes. Panels indicated on architectural Drawings shall be furnished under this section. Required panels for access to equipment, but not indicated on architectural Drawings, shall be furnished as part of Work requiring access.

3.02 INSTALLATION

- B. Install panels accurately in location, perfect alignment, plumb, straight and true. Brace to prevent displacement by adjacent Work.
- C. Examine panels after installation for proper opening, closing and clearances. Replace damaged or defective panels.

3.03 CLEANING

- A. Remove rubbish, debris and waste materials and legally dispose of off Project site.

3.04 PROTECTION

- A. Protect Work of this section until Substantial Completion.

END OF SECTION

SECTION 08 41 00
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Aluminum doors complete with hardware.

B. Related Sections:

1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
2. Section 05 40 00 Cold Formed Metal Framing.
3. Section 07 90 00 Joint Sealants.
4. Section 08 71 00 Door Hardware.
5. Section 08 80 00 Glazing.

1.02 REFERENCES

A. Aluminum Association (AA):

1. DAF-45 Designation System for Aluminum Finishes.

B. American Architectural Manufacturers Association (AAMA):

1. 501.2 Field Check of Metal Curtain Walls for Water Leakage.
2. 2605 Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
3. 606.1 Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum.
4. 607.1 Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.
5. 608.1 Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.
6. 701.2 Specifications for Pile Weatherstripping.
7. Manual #10 Care and Handling of Architectural Aluminum From Shop to Site.
8. SFM-1 Aluminum Storefront and Entrance Manual.

C. American National Standards Institute (ANSI):

1. A117.1 Safety Standards for the Handicapped.

D. American Society for Testing and Materials (ASTM):

1. A36 Structural Steel.
2. A123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. B209 Aluminum and Aluminum - Alloy Sheet and Plate.

4. B221 Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
5. B308 Aluminum-Alloy 6061-T6 Standard Structural Shapes, Rolled or Extruded.
6. E283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.
7. E330 Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
8. E331 Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

E. Federal Specifications (FS):

1. TT-P-641G(1) Primer Coating, Zinc Dust-Zinc Oxide (For Galvanized Surfaces).
2. TT-P-645A Primer, Paint, Zinc Chromate, Alkyd Type.

F. Steel Structures Painting Council (SSPC):

1. Paint 12 Cold-Applied Asphalt Mastic (Extra Thick Film).

1.03 SYSTEM REQUIREMENTS

A. Design Requirements:

1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
2. Requirements shown by details are intended to establish basic dimension of units, sight lines and profiles of members.
3. Provide concealed fastening.
4. Provide entrance and storefront systems, including necessary modifications, to meet specified requirements and maintaining visual design concepts.
5. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
6. Anchors, fasteners and braces shall be structurally stressed not more than 50% of allowable stress when maximum loads are applied.
7. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.

1.04 SUBMITTALS

A. General: Submit in accordance with Conditions of the Contract and Division 1 Specification sections.

B. Product Data:

1. Submit manufacturer's descriptive literature and product specifications.
2. Include information for factory finishes, hardware, accessories, and other required components.
3. Include color charts for finish indicating manufacturer's standard colors available for

selection.

C. Shop Drawings:

1. Submit shop drawings covering fabrication, installation and finish of specified systems.
2. Include following:
 - a. Fully dimensioned plans and elevations with detail coordination keys.
 - b. Locations of exposed fasteners and joints.
3. Provide detailed drawings of:
 - a. Composite members.
 - b. Joint connections for framing systems and for entrance doors.
 - c. Anchorage.
 - d. System reinforcements.
 - e. System expansion and contraction provisions.
 - f. Glazing methods and accessories.
 - g. Internal sealant requirements and recommended types.
4. Schedule of finishes.

D. Samples:

1. Submit manufacturers standard samples indicating quality of finish.
2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.

E. Qualification Data:

1. Submit installer qualifications verifying years of experience.

1.05 QUALITY ASSURANCE

A. Single Source Responsibility:

1. To ensure quality of appearance and performance, obtain materials for systems from either a single manufacturer or from manufacturer approved by systems manufacturer.

B. Installer Qualifications: Certified in writing by system manufacturer as qualified for installation of specified systems.

C. Perform Work in accordance with AAMA SFM-1 and manufacturer's written instructions.

D. Conform to requirements of ANSI A117.1 and local amendments.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Division 01.

B. Protect finished surfaces as necessary to prevent damage.

C. Do not use adhesive papers or sprayed coatings which become firmly bonded when exposed to sun.

- D. Do not leave coating residue on any surfaces.
 - E. Replace damaged units.
- 1.07 WARRANTY
- A. Provide warranties in accordance with Division 01.
 - B. Provide written warranty in form acceptable to Owner jointly signed by manufacturer, installer and Contractor warranting work to be watertight, free from deflective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail within 1 year from date of Substantial Completion.
 - C. Warranty shall cover following:
 - 1. Complete watertight and airtight system installation within specified tolerances.
 - 2. System is structurally sound and free from distortion.
 - D. Provide written warranty stating organic coating finish will be free from fading more than 10%, chalking, yellowing, peeling, cracking, pitting, corroding or non-uniformity of color, or gloss deterioration beyond manufacturer's descriptive standards for 5 years from date of Substantial Completion and agreeing to promptly correct defects.

PART 2 - PRODUCTS

2.01 MANUFACTURERS AND PRODUCTS

- A. Subject to compliance with requirements indicated, provide products by one of the following:
 - 1. Oldcastle BuildingEnvelope, Terrell, TX.
 - 2. Or approved equal.
- B. Substitutions: Submit under provisions of Division 01.
- C. Acceptable Door Entrance Systems:

Standard duty systems (0.125" wall thickness; 1-3/4" deep)
Model 500 - wide stile (12" bottom rail, 4-1/2" top rail, 5-1/2" verticals)
- D. Storefront Systems:

FG-2000 1-3/4 x 4-1/2 inch framing that accepts 1/4 glass.

2.02 FRAMING MATERIALS AND ACCESSORIES

- A. Aluminum:
 - 1. ASTM B221, alloy 6063-T5 for extrusions; ASTM B209, alloy 5005-H16 for sheets; or other alloys and temper recommended by manufacturer appropriate for specified finish.

- B. Internal Reinforcing:
 - 1. ASTM A36 for carbon steel; or ASTM B308 for structural aluminum.
 - 2. Shapes and sizes to suit installation.
 - 3. Steel components factory coated with alkyd type zinc chromate primer complying with FS TT-P-645.
 - C. Anchorage Devices:
 - 1. Manufacturer's standard formed or fabricated steel or aluminum assemblies of shapes, plates, bars or tubes.
 - 2. Hot-dip galvanize steel assemblies after fabrication, comply with ASTM A123, 2.0 ounce minimum coating.
 - D. Fasteners:
 - 1. Aluminum, non-magnetic stainless steel or other non-corrosive materials compatible with items being fastened.
 - 2. Provide concealed fasteners wherever possible.
 - 3. For exposed locations, provide Phillips flathead screws with finish matching item fastened.
 - 4. For concealed locations, provide manufacturer's standard fasteners.
 - E. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.
 - F. Protective Coatings: Cold-applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.
 - G. Touch-Up Primer for Galvanized Components: Zinc oxide conforming with FS TT-P-641.
 - H. Glazing Gaskets:
 - 1. Compression type design, replaceable, molded or extruded, of neoprene, polyvinyl chloride (PVC), or ethylene propylene diene monomer (EPDM).
 - 2. Profile and hardness as required to maintain uniform pressure for watertight seal.
 - I. Weatherstripping:
 - 1. Wool pile conforming to AAMA 701.2.
 - 2. Provide EPDM or vinyl-blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.
 - J. Adjustable and Fixed Vertical Corners:
 - 1. Field adjustable corner with 168 degree to 178 degree range of movement. Equal to Old Castle Part No. V0508.
 - 2. Outside corner set at 135 degrees. Equal to Old Castle Part No. V0510.
- 2.03 GLASS AND GLAZING ACCESSORIES
- A. Refer to Section 08 80 00.

2.04 DOOR HARDWARE

- A. Refer to Section 08 71 00.

2.05 FABRICATION

- A. Coordination of Fabrication:
 - 1. Check actual frame or door openings required in construction work by accurate field measurements before fabrication.
 - 2. Fabricate units to withstand loads which will be applied when system is in place.
- B. General
 - 1. Conceal fasteners wherever possible.
 - 2. Reinforce work as necessary for performance requirements, and for support to structure.
 - 3. Separate dissimilar metals and aluminum in contact with concrete utilizing protective coating or preformed separators which will prevent contact and corrosion.
 - 4. Comply with Section 08 80 00 for glazing requirements.
- D. Entrance Doors:
 - 1. Fabricate with mechanical joints using internal steel reinforcing plates and shear blocks attached with fasteners and by welding.
 - 2. Provide extruded aluminum glazing stops of square design, permanently anchored on security side and removable on opposite side.
- E. Hardware:
 - 1. Receive hardware supplied in accordance with Section 08 71 00 and install in accordance with requirements of this Section.
 - 2. Cut, reinforce, drill and tap frames and doors as required to receive hardware.
 - 3. Comply with hardware manufacturer's templates and instructions.
 - 4. Use concealed fasteners wherever possible.
- F. Welding:
 - 1. Comply with recommendations of the American Welding Society.
 - 2. Use recommended electrodes and methods to avoid distortion and discoloration.
 - 3. Grind exposed welds smooth and flush with adjacent surfaces; restore mechanical finish.
- G. Flashings: Form from sheet aluminum with same finish as extruded sections. Material thickness as required to suit condition without deflection or "oilcanning".

2.06 FINISHES

- A. Clear Anodized:
 - 1. Conforming to AA-M12C22A31 and AAMA 607.1.
 - 2. Architectural Class II, etched, medium matte, clear anodic coating, 0.4 mil minimum thickness.
 - 3. Match existing storefront clear anodized as close as possible.

PART 3 - EXECUTION**3.01 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 01 43 00.

3.02 INSTALLATION**A. Erection Tolerances:**

- 1. Limit variations from plumb and level:
 - a. 1/8 inch in 10'-0" vertically.
 - b. 1/8 inch in 20'-0" horizontally.
- 2. Limit variations from theoretical locations: 1/4 inch for any member at any location.
- 3. Limit offsets in theoretical end-to-end and edge-to-edge alignment: 1/16 inch from flush surfaces not more than 2 inches apart or out-of-flush by more than 1/4 inch.

- C. Install doors and hardware in accordance with manufacturer's printed instructions.

- D. Set units plumb, level and true to line, without warp or rack of frame.

- E. Anchor securely in place, allowing for required movement, including expansion and contraction.

- F. Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces, with bituminous paint or preformed separators to prevent contact and corrosion.

- G. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weathertight construction.

- H. Coordinate installation of perimeter sealant and backing materials between assemblies and adjacent construction in accordance with requirements of Section 07 90 00.

- H. Glazing: Refer to requirements of Section 08 80 00.

3.03 ADJUSTING

- A. Test door operating functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation.

3.04 CLEANING

- A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.

- B. Clean metal surfaces exercising care to avoid damage.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.
- B. This Section includes the following, but is not necessarily limited to:
 - 1. Door Hardware, including electric hardware.
 - 2. Storefront and Entrance door hardware.
 - 3. Gate Hardware.
 - 4. Digital keypad access control devices.
 - 5. Thresholds, gasketing and weather-stripping.
 - 6. Door silencers or mutes.
 - 7. Power supplies for electric hardware.
- C. Related Sections:
 - 1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
 - 2. Section 08 41 00: Aluminum-Framed Entrances and Storefronts.
 - 3. Division 28: Security Access Systems.
- D. Related Documents
 - 1. Drawings and general provisions of Contract, including General and Supplementary Conditions of Division 1 Specification Sections, apply to this Section.

1.02 REFERENCES

- A. 2022 California Building Code, CCR, Title 24.
- B. BHMA – Builders’ Hardware Manufacturers Association
- C. CCR – California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.
- D. DHI – Door and Hardware Institute
- E. NFPA - National Fire Protection Association.
 - 1. NFPA 80 – Standard for Fire Doors and Other Opening Protectives
 - 2. NFPA 105 – Standard for Smoke Door Assemblies and Other Opening Protectives

- F. UL - Underwriters Laboratories.
 - 1. UL 10C – Standard for Positive Pressure Fire Tests of Door Assemblies
 - 2. UL 305 – Standard for Panic Hardware
- G. WHI - Warnock Hersey Incorporated
- H. SDI - Steel Door Institute

1.03 SUBMITTALS & SUBSTITUTIONS

- A. General: Submit in accordance with Conditions of the Contract and Division 1 Specification sections.
- B. Submit product data (catalog cuts) including manufacturers' technical product information for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
- C. Submit six (6) copies of schedule organized vertically into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:
 - 1. Include a Cover Sheet with:
 - a. Job Name, location, telephone number.
 - b. Architects name, location and telephone number.
 - c. Contractor's name, location, telephone number and job number.
 - d. Suppliers name, location, telephone number and job number.
 - e. Hardware consultant's name, location and telephone number.
 - 2. Job Index information included:
 - a. Numerical door number index including; door number, hardware heading number and page number.
 - b. Complete keying information (referred to DHI hand-book "Keying Systems and Nomenclature"). Provision should be made in the schedule to provide keying information when available; if it is not available at the time the preliminary schedule is submitted.
 - c. Manufacturers' names and abbreviations for all materials.
 - d. Explanation of abbreviations, symbols, and codes used in the schedule.
 - e. Mounting locations for hardware.
 - f. Clarification statements or questions.
 - g. Catalog cuts and manufacturer's technical data and instructions.
 - 3. Vertical schedule format sample:
 - a. Single or pair with opening number and location.
 - b. Degree of opening

- c. Hand of door(s)
 - d. Door and frame dimensions and door thickness.
 - e. Label requirements if any.
 - f. Door by frame material.
 - g. (Optional) Hardware item line #.
 - h. Keypad Symbol.
 - i. Quantity.
 - j. Product description.
 - k. Product Number.
 - l. Fastenings and other pertinent information.
 - m. Hardware finish codes per ANSI A156.18.
 - n. Manufacture abbreviation.
- D. Make substitution requests in accordance with Division 1. Substitution requests must be made prior to bid date. Include product data and indicate benefit to the project. Furnish samples of any proposed substitution.
- E. Wiring Diagrams: Provide product data and wiring and riser diagrams for all electrical products listed in the Hardware Schedule portion of this section.
- F. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
- G. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- H. Furnish as-built/as-installed schedule with close-out documents, including keying schedule and transcript, wiring/riser diagrams, manufacturers' installation and adjustment and maintenance information.
- I. Fire Door Assembly Testing: Submit a written record of each fire door assembly to the Owner to be made available to the Authority Having Jurisdiction (AHJ) for future building inspections.
- J. LEED Certification Points: Submit information and certifications necessary to achieve maximum points for LEED certification; coordinate and cooperate with Owner and Architect in providing information necessary for required LEED rating.

1.04 QUALITY ASSURANCE

- A. Obtain each type of hardware (latch and lock sets, hinges, closers, exit devices, etc.) from a single manufacturer.
- B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project and that

- employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
1. Responsible for detailing, scheduling and ordering of finish hardware.
 2. Meet with Owner to finalize keying requirements and to obtain final instructions in writing. To maintain the integrity of patented key systems, provide a letter of authorization from the specified manufacturer indicating that supplier has authorization to purchase the key system directly from the manufacturer.
 3. Stock parts for products supplied and are capable of repairing and replacing hardware items found defective within warranty periods.
- C. Hardware Installer: Company specializing in the installation of commercial door hardware with five years documented experience.
- D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.
1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".
- E. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.
- F. Product packaging to be labelled in compliance with CA Prop 65, Safe Drinking Water and Toxic Enforcement Act of 1986.
- G. Pre-Installation Conference
1. Schedule a pre-installation conference at least one week prior to beginning work of this section.
 2. Attendance: Architect, Construction Manager, Contractor, Security Contractor, Hardware Supplier, Installer, Key Owner Personnel, and Project Inspector.
 3. Agenda: Review hardware schedule, products, installation procedures and coordination required with related work. Review Owner's keying standards.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Coordinate delivery of packaged hardware items to the appropriate locations (shop or field) for installation.
- B. Hardware items shall be individually packaged in manufacturers' original containers, complete with proper fasteners. Clearly mark packages on outside to indicate contents and locations in hardware schedule and in work.

- C. Provide locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, etc.
- D. Contractor to inventory door hardware jointly with representatives of hardware supplier and hardware installer until each all are satisfied that count is correct.

1.06 WARRANTY

- A. Provide warranties of respective manufacturers' regular terms of sale from day of final acceptance as follows:
 - 1. Locksets: "L" Series (3) years – "ND" Ten (10) years.
 - 2. Electronic: One (1) year.
 - 3. Closers: Thirty (30) years.
 - 4. Exit devices: Three (3) years.
 - 5. All other hardware: Two (2) years.

1.07 MAINTENANCE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

1.08 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-installation conference at least one week prior to beginning work of this section.
- B. Attendance: Architect, Construction Manager, Contractor, Security Contractor, Hardware Supplier, Installer, Key District Personnel, and Project Inspector.
- C. Agenda: Review hardware schedule, products, installation procedures and coordination required with related work. Review District's keying standards.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

<u>Item</u>	<u>Manufacturer</u>	<u>Acceptable Substitutes</u>
Hinges	Ives	Hager, Stanley, McKinney
Locks, Latches & Cylinders	Schlage	Or Approved Equal
Exit Devices	Von Duprin	Or Approved Equal
Closers	LCN	Or Approved Equal

Push, Pulls & Protection Plates	Ives	Trimco, BBW, DCI
Flush Bolts	Ives	Trimco, BBW, DCI
Dust Proof Strikes	Ives	Trimco, BBW, DCI
Coordinators	Ives	Trimco, BBW, DCI
Stops	Ives	Trimco, BBW, DCI
Overhead Stops	Glynn-Johnson	Or Approved Equal
Thresholds	Zero	Pemko, National Guard
Seals & Bottoms	Zero	Pemko, National Guard

2.02 MATERIALS

B. Continuous Hinges: Ives as scheduled.

1. SL-224HD (Heavy use exterior doors & Remodels) US28 Clear Anodized.

D. Exit devices: Von Duprin as scheduled.

1. AX-LD-9847-L (Standard Door) 626 Satin Chrome finish
2. AX-LD-RX-LC-QEL-9847-L (Access Controlled Door) 626 Satin Chrome finish
 - a. Vertical top and bottom rods.
 - b. Provide top and bottom strikes.
3. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 - 2001 standards.
4. All internal parts shall be of cold-rolled steel with zinc dichromate coating.
5. Non-handed basic device design with center case interchangeable with all functions.
6. All devices shall have quiet return fluid dampeners.
7. Device shall bear UL label for fire and or panic as may be required.
9. Lever Trim: "Breakaway" design, forged brass or bronze escutcheon with a minimum of .130" thickness, match lockset lever design.
10. All Exit Devices to be sex-bolted to the doors.
11. Panic Hardware shall comply with CBC Section 11B.404.2.7 and shall be mounted between 34" and 44" above the finished floor surface.
 - a. Provide exit devices UL certified to meet maximum 5-pound requirements according to the California Building Code section 11B-309.4, and UL listed for Panic Exterior Fire Exit Hardware.

E. Closers: LCN as scheduled. Place closers inside building, stairs, room, etc.

1. P4040XP – Aluminum finish.

a. Hold open arms or cushion closers are not allowed.

2. Door closer cylinders shall be of high strength cast iron construction with double heat-treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.
3. All door closers shall be fully hydraulic and have full rack and pinion action with a shaft diameter of a minimum of 11/16 inch and piston diameter of 1 inch to ensure longevity and durability under all closer applications.
4. All parallel arm closers shall incorporate one-piece solid forged steel arms with bronze bushings. 1-9/16" steel stud shoulder bolts, shall be incorporated in regular arms, hold-open arms, arms with hold open and stop built in. All other closers to have forged steel main arms for strength, durability, and aesthetics for versatility of trim accommodation, high strength and long life.
5. All parallel arm closers so detailed shall provide advanced backcheck for doors subject to severe abuse or extreme wind conditions. This advanced backcheck shall be located to begin cushioning the opening swing of the door at approximately 45 degrees. The intensity of the backcheck shall be fully adjustable by tamper resistant non-critical screw valve.
6. Closers shall be installed to permit doors to swing 180 degrees.
7. All closers shall utilize a stable fluid withstanding temperature range of 120 degrees F. to -30 degrees F. without requiring seasonal adjustment of closer speed to properly close the door.
8. Provide the manufactures drop plates, brackets and spacers as required at narrow head rails and special frame conditions. NO wood plates or spacers will be allowed. Door frames shall be reinforced at all mounting locations.
9. Maximum effort to operate closers shall not exceed 5 lbs., such pull or push effort being applied at right angles to hinged doors. Compensating devices or automatic door operators may be utilized to meet the above standards. When fire doors are required, the maximum effort to operate the closer may be increased but shall not exceed 15 lbs. when specifically approved by fire marshal. All closers shall be adjusted to operate with the minimum amount of opening force and still close and latch the door. These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position. Per 11B- 404.2.8.1, door shall take at least 5 seconds to move from an open position of 90 degrees to a position of 12 degrees from the latch jamb.

G. Door Stop/Hold Opens: Ives as scheduled.

1. FS40 (Interior Floor) 626 Satin Chrome finish
2. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
3. Do not install floor stops more than four (4) inches from the face of the wall or partition (CBC Section 11B-307).

I. Protection Plates: Ives as scheduled.

1. Kick Plate: 8400-10" x 2" LDW 626 Satin Chrome

5. Fabricate either kick, armor, or mop plates with four beveled edges. Provide kick plates 10" high and 2" LDW. Sizes of armor and mop plates shall be listed in the Hardware Schedule. Furnish with machine or wood screws of bronze or stainless to match other hardware.
- N. Keying: Schlage as scheduled.
1. Furnish a Proprietary Schlage master key system as directed by the owner or architect. Key system to be designated and combination-d by the Schlage Master Key Department even if pinned by the Authorized Key Center, Authorized Security Center or a local authorized commercial dealer. This is to be a Schlage Primus keying system. SCUSD to verify all keyways. Provide as follows:
 - a. 6 pin x Standard Core plug (D Series) 626 finish
 - b. 6 pin x Rim type x IC Core (Exit Device) 626 finish
 - c. 6 pin x 1-1/4" Mortise x IC Core (KR Mullions and CD) 626 finish
 2. Match existing cylinder keying with adjacent existing lobby doors.
 4. Furnish all cylinders in the Schlage conventional style except the exit device and removable mullion cylinders which will be supplied in Schlage Full Size Interchangeable Core (FSIC). Pack change keys independently (PKI).
 5. Furnish PrimusXP "Classic" keyway Patent Protected Schlage cylinders where noted. Furnish all other cylinders in matching conventional "Classic" keyway. Furnish Patent Protected Schlage keys for all cylinders. (e.g., Primus XP Classic Keyway for patent protected / Maximum control) (with mix of conventional "Classic" keyway)
 6. Furnish all keys with visual key control.
 - a. Stamp key "Do Not Duplicate".
 7. Furnish mechanical keys as follows:
 - a. Furnish 2 cut change keys for each different change key code.
 - b. Furnish 1 uncut key blank for each change key code.
 - c. Furnish 6 cut master keys for each different master key set.
 - d. Furnish 3 uncut key blanks for each master key set.
- O. Fasteners
1. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.
 2. Screws for butt hinges shall be flathead, countersunk, full-thread type.
 3. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.
 4. Provide expansion anchors for attaching hardware items to concrete or masonry.
 5. All exposed fasteners shall have a Phillips head.
 6. Finish of exposed screws to match surface finish of hardware or other adjacent work.
 7. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

2.04 FINISHES

- A. Generally, to be Satin Chrome 626 or US26D unless otherwise noted.
- B. Door closers shall be powder-coated to match other hardware, unless otherwise noted.
- C. Aluminum items to be finished anodized aluminum except thresholds which can be furnished as standard mill finish.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed by the manufacturer.
- B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and requirements of DHI.
- B. Use the templates provided by hardware item manufacturer.
- C. Mounting heights for hardware shall be as recommended by the Door and Hardware Institute. Operating hardware will to be located between 34" and 44" AFF.
- D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Set thresholds for exterior doors in full bed of butyl-rubber sealant.
- G. Hardware Installer shall coordinate with security contractor to route cable to connect electrified locks, panic hardware and fire exit hardware to power transfers or electric hinges at the time these items are installed so as to avoid disassembly and reinstallation of hardware.
- H. Hardware Installer shall also be present with the security contractor when the power is turned on for the testing of the electronic hardware applications. Installer shall make adjustments to solenoids, latches, vertical rods and closers to insure proper and secure operation.
- I. All wiring for electro-mechanical hardware mounted on the door shall be connected through the power transfer and terminated in the interface junction box specified for in the Electrical Section.

- J. Conductors shall be minimum 18 gage stranded, multicolored. A minimum 12 in. loop of conductors shall be coiled in the interface junction box. Each conductor shall be permanently marked with its function.
- K. If a power supply is specified in the hardware sets, all conductors shall be terminated in the power supply. Make all connections required for proper operation between the power supply and the electro-mechanical hardware. Provide the proper size conductors as specified in the manufacturer's technical documentation.
- L. Hardware Locations
 - 1. Conform to CCR, Title 24, Part 2; and ADAAG; and the drawings for access-compliant positioning requirements for the disabled.
- M. Panic Device Rod Strikes
 - 1. At bottom strike, carefully cut existing ceramic tile as required to install strike in floor.
 - 2. At top strike, cut and recess into new aluminum door frame.

3.03 ADJUSTING AND CLEANING

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Clean adjacent surface soiled by hardware installation.
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy, return to that work area and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware finishes, during the final adjustment of hardware.
- E. Continued Maintenance Service: Approximately six months after the completion of the project, the Contractor accompanied by the Architectural Hardware Consultant, shall return to the project and re-adjust every item of hardware to restore proper functions of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.05 FIELD QUALITY CONTROL

- A. Contractor is responsible for providing the services of an Architectural Hardware Consultant (AHC) or a proprietary product technician to inspect installation and certify that hardware and its installation have been furnished and installed in accordance with manufacturers’ instructions and as specified herein.

3.06 SCHEDULE

- A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.
- B. While the hardware schedule is intended to cover all doors, and other movable parts of the building, and establish type and standard of quality, the contractor is responsible for examining the Plans and Specifications and furnishing proper hardware for all openings whether listed or not. If there are any omissions in hardware groups in regard to regular doors they shall be called to the attention of the Architect prior to bid opening for instruction; otherwise, list will be considered Complete. No extras will be allowed for omissions.
- C. The Door Schedule on the Drawings indicates which hardware set is used with each door.

Manufacturers Abbreviations (Mfr.)

GLY	=	Glynn-Johnson Corporation	Overhead Door Stops
IVE	=	Ives	Hinges, Pivots, Bolts, Coordinators, Dust Proof Strikes, Push Pull & Kick Plates, Door Stops & Silencers
LCN	=	LCN	Door Closers
SCE	=	Schlage Electronics	Electronic Door Components
SCH	=	Schlage Lock Company	Locks, Latches & Cylinders
VON	=	Von Duprin	Exit Devices
ZER	=	Zero International	Thresholds, Gasketing & Weather-stripping
PEM	=	Pemko	Overhead Drips
RIX	=	Rixson	Magnetic Door Hold Opens

HARDWARE GROUP NO. 01 – NEW INTERIOR PAIR OF DOORS IN NEW FRAME / SECURE PANIC W/ ACCESS CONTROL

DOOR NUMBERS – D01, D02

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT HINGE	224XY EPT	US28	IVE
1	EA	POWER TRANSFER	EPT10	SP28	VON
1	EA	ELEC PANIC	AX-LD-RX-LC-QEL-9847-L	626	VON
1	EA	PANIC	AX-LD-9847-L	626	VON
2	EA	TOP STRIKE	338	BRASS	VON
2	EA	BOTTOM STRIKE	385A	BRASS	VON
2	EA	PRIMUS CORE	AS REQUIRED	626	SCH
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	FLOOR STOP	FS438	626	IVE
2	EA	KICKPLATE	4800 12" X 2" LDW	626	IVE
1	EA	POWER SUPPLY	SEE DIV 28	-	-
1	EA	CARD READER	SEE DIV 28	-	-

HARDWARE GROUP NO. 02 – NEW EXTERIOR SINGLE DOOR IN EXISTING FRAME / SECURE PANIC W/ ACCESS CONTROL

DOOR NUMBERS – D08

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT HINGE	224XY EPT	US28	IVE
1	EA	POWER TRANSFER	EPT10	SP28	VON
1	EA	ELEC PANIC	AX-LD-RX-LC-QEL-9847-L	626	VON
1	EA	PRIMUS CORE	AS REQUIRED	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	FLOOR STOP	FS438	626	IVE
1	EA	KICKPLATE	4800 12" X 2" LDW	626	IVE
1	EA	DOOR SWEEP	328AA	AA	ZER
1	EA	POWER SUPPLY	SEE DIV 28	-	-
1	EA	CARD READER	SEE DIV 28	-	-

HARDWARE GROUP NO. 03 – EXISTING EXTERIOR PAIR OF DOORS IN EXISTING FRAME / SECURE PANIC W/ ACCESS CONTROL

DOOR NUMBERS – D09

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1 EA	ELEC PANIC*	AX-LD-RX-LC-QEL-9847-L	626	VON
1 EA	TOP STRIKE	338	BRASS	VON
1 EA	PRIMUS CORE	AS REQUIRED	626	SCH
1 EA	POWER SUPPLY	SEE DIV 28	-	-
1 EA	ARMORED WHIP	SEE DIV 28	-	-
1 EA	CARD READER	SEE DIV 28	-	-

On right hand leaf, remove existing panic bar and replace with new. Existing panic bar on left leaf to remain in place. Replace internal rods with new. Install new top strike in existing frame.

HARDWARE GROUP NO. 04 – EXISTING EXTERIOR SINGLE DOOR IN EXISTING FRAME / SECURE PANIC W/ ACCESS CONTROL

DOOR NUMBERS – D10

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1 EA	ELECTRIC STRIKE**	6300 SERIES	626	VON
1 EA	PRIMUS CORE	AS REQUIRED	626	SCH
1 EA	POWER SUPPLY	SEE DIV 28	-	-
1 EA	ARMORED WHIP	SEE DIV 28	-	-
1 EA	CARD READER	SEE DIV 28	-	-

Modify existing frame as required to install new electric strike.

HARDWARE GROUP NO. 05 - INTERIOR SINGLE DOOR / SECURE PANIC W/ ACCESS CONTROL

DOOR NUMBERS – D03, D04

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3 EA	BUTT HINGE	5BB1HW	626	IVE
1 EA	POWER TRANSFER	EPT10	SP28	VON
1 EA	ELEC PANIC	AX-LD-RX-LC-QEL-98-L	626	VON
2 EA	PRIMUS CORE	AS REQUIRED	626	SCH
1 EA	SURFACE CLOSER	4040XP EDA	689	LCN
1 EA	FLOOR STOP	FS438	626	IVE
1 EA	KICKPLATE	4800 12" X 2" LDW	626	IVE
1 EA	POWER SUPPLY	SEE DIV 28	-	-
1 EA	CARD READER	SEE DIV 28	-	-

HARDWARE GROUP NO. 06 – EXTERIOR SITE SINGLE GATE W/ ACCESS CONTROL

GATE NUMBERS – G01

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	HINGE/CLOSER	SEE 32 31 19	--	--
1	EA	PANIC	AX-LD-98-NL	626	VON
1	EA	ELECT SURFACE STRIKE	6300 SERIES (SEE DIV 28)	626	VON
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	POWER SUPPLY	SEE DIV 28	-	-
1	EA	CARD READER	SEE DIV 28	-	-

END OF SECTION

**SECTION 08 80 00
GLAZING**

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Glass and glazing for storefronts and doors.
- B. Speak-Thru.

1.02 RELATED SECTIONS

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
- B. Section 07 90 00: Joint Sealers: Sealant and back-up material.
- C. Section 08 41 00: Aluminum-Framed Entrances and Storefronts.

1.03 REFERENCES

- A. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
- B. ASTM C864 - Dense Elastomeric Compression Seal Gaskets, Setting Blocks and Spacers.
- C. ASTM C920 - Elastomeric Joint Sealants.
- D. ASTM C1036 - Flat Glass.
- E. ASTM C1048 - Heat Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
- F. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
- G. ASTM D2240 - Test Method for Rubber Property - Durometer Hardness.
- H. CPSC 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.
- I. ASTM C 1048 – Standard Specification for Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass.
- J. ASTM E2010-01: Standard Test Method for Positive Pressure Fire Tests of Window Assemblies.

1.04 SUBMITTALS

- A. Submit under provisions of Section 00 72 00.
- B. Product Data on Glass Types Specified: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special handling or installation requirements. Identify available colors.
- D. Samples: Submit two samples, 12x12 inch in size, illustrating glass.
- E. Samples: Submit 3 inch long bead of glazing sealant, color as selected.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with FGMA Glazing Manual, FGMA Sealant Manual for glazing installation methods.
- B. Installer's Qualifications: The installation shall be performed only by an installation firm normally engaged in this business. All work shall be performed by qualified mechanics who specialize in glazing and glass installation.
- C. Safety glazing shall be identified in accordance with Section 2406.2, 2016 C.B.C., Title 24, Part 2 with identification etched in glass.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 48 hours after installation of glazing compounds.

1.07 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop Drawings.

1.08 COORDINATION

- A. Coordinate Work with glazing frames, wall openings, and adjacent Work.

PART 2 – PRODUCTS

2.01 GENERAL

- A. All Glass shall be graded and meet requirements of ASTM C1036. Each light of glass delivered and installed shall have affixed thereto the manufacturer's grade label.

2.02 GLASS TYPES

- A. **Type 1/4CL:** Laminated 7/32" glass with .030 inch interlayer. Clear.

2.03 GLAZING COMPOUNDS

- A. Glazing Sealants (non-sag type): Dow Corning 795, Tremco "Proglaze" or GE Silicone Sealants; Tremco "Mono" acrylic sealant.
- B. Glazing Compound: Shall meet requirements of ASTM C669-00.

2.04 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene EPDM blocks with a Shore A durometer hardness of 85, plus or minus 5 percent, chemically compatible with sealant used.
- B. Spacer Shims: Neoprene, 50-60 Shore A durometer hardness, minimum 3 inch long x one half the height of the glazing stop x thickness to suit application.
- C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 - 15 Shore A durometer hardness; coiled on release paper; black color; Tremco No. 440 tape.
- D. Glazing Splines: Resilient polyvinyl chloride extruded shape to suit glazing channel retaining slot; black color.
- E. Miscellaneous: Furnish all primers-sealers, setting blocks, shims, spacers, compression seals, etc., as required for a first class workmanlike job.
- F. Speak-Thru: 4 inch diameter satin anodized metal cover Model #405 by CRL, or approved equal.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify prepared openings for adequacy to receive glass.
- B. Verify that openings for glazing are correctly sized and within tolerance.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
- D. Report in writing to, any conditions that may be detrimental to the Work.
- E. Only laminated glass lites are to be installed in metal doors.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

- C. Check that glass is free of edge damage or face imperfections.

3.03 INSTALLATION

- A. General: Install glass types at locations indicated, according to glass manufacturer's recommendations and as specified herein.
- B. Glass Glazing:
 - 1. Positioning Glass: Orient pattern and draw of glass pieces in same direction. Set all sheet glass so that any waves, etc. are horizontal.
 - 2. Do not cut, nip or abrade tempered glass.
 - 3. Watershed: Gunnable sealants, when applied as a cap head, shall form a bevel or watershed away from the glass. When tape is used to the sightline, it shall form a watershed when compressed. Do not undercut a sealant, compound, or tape below the sightline. Tool and finish sealant as required. Use tooling solution recommended by the sealant manufacturer.
 - 4. Positive Contact:
 - a. When applying a heel bead, lap onto the glass a minimum of 3/16".
 - b. When applying a toe bead, whether continuous or a corner seal, make certain it is large enough to contact both the glass and sash. Install the sealant prior to glass placement.
 - 5. Setting blocks shall be 1/16" less than the full rabbet width, minimum length of 4" and high enough to provide the recommended minimum bite and edge clearance for the glass. Center blocks at 1/4 points unless otherwise recommended by the glass manufacturer.
 - 6. Provide spacer-shims at a maximum of 24" o.c.
 - 7. Clearances: Observe minimum face clearances, edge clearance and glass bite as recommended by the glass and sealant manufacturer.
 - 8. Tape Installation: Do not install glazing tapes more than one day ahead of glass placement. Remove the paper backing from the tape only when the lite is ready to be installed. Do not stretch the tape to make it fit. Do not overlap the ends of the tape. Instead, butt ends together, and when corners are butted together, daub with sealant to assure a positive seal.
 - 9. Glazing tapes must be kept under proper compression.
 - 10. Glazing stops shall be installed so that stop or frame does not bear directly against glass.

3.04 CLEANING

- A. Clean work under provisions of 00 72 00.
- B. Remove glazing materials from finish surfaces.

- C. Remove labels after work is complete.
- D. Clean glass.

3.05 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 00 72 00.
- B. Replacement: At completion of building construction and prior to its acceptance, all broken, cracked, excessively scratched, or otherwise imperfect glazing materials included under this Section shall be replaced with new glazing materials of the type specified, as directed by the Architect, and at no additional cost to the Owner.

END OF SECTION

**SECTION 09 29 00
GYPSUM BOARD**

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. Gypsum board.
- B. Taped and sanded joint treatment.
- C. Accessories.

1.02 RELATED WORK

- A. The Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 05 40 00: Cold-Formed Metal Framing.
- C. Section 06 06 60: Translucent Resin Panel System.
- C. Section 07 90 00: Joint Sealants.
- F. Section 09 90 00: Painting.

1.03 REFERENCES

- A. ANSI/ASTM C1396 / C1396M-14a - Gypsum Wallboard.
- B. ANSI/ASTM C514-04(2014) - Nails for the Application of Gypsum Wallboard.
- C. ANSI/ASTM C630/C630M-03 - Water Resistant Gypsum Backing Board.
- D. Gypsum Association GA 216 - Application and Finishing of Gypsum Board Products.
- E. ASTM C645-14e1 - Non-Load Bearing (Axial) Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.
- F. ASTM C840-16 - Application and Finishing of Gypsum Board.
- G. ASTM C955-15e1 - Load Bearing (Transverse and Axial) Steel Studs, Runners (Track) and Bracing or Bridging, for Screw Application of Gypsum Board.
- H. ASTM C1002-14 - Steel Drill Screws for the Application of Gypsum Wallboard.
- I. ASTM C1047-14a - Accessories for Gypsum Wallboard and Gypsum Veneer Base.

1.04 QUALITY ASSURANCE

- A. Applicator: Company specializing in gypsum board systems work with minimum five years experience.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver: All materials shall be delivered in original packages or bundles with the manufacturer's labels intact and legible.
- B. Handling and Storage: Materials shall be kept dry, stacked off the ground and properly supported and protected from weather. Protect all edges and surfaces. Stack wallboard flat.

1.06 JOB CONDITIONS

- A. Building Temperature and Ventilation: Do not install wallboard and joint compounds if building temperature is below 55 degrees F and proper ventilation is not provided to eliminate excessive moisture from building.
- B. Protect work in progress as well as work of other trades. Clean surfaces that have been spotted during wallboard application.

1.07 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 00 72 00.
- B. Provide product data on metal framing, gypsum board, joint tape, and topping compound.
- C. Submit manufacturer's installation instructions under provisions of Section 00 72 00.
- D. Submit 2' x 2' sample of all specified finish levels and textures.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS GYPSUM BOARD SYSTEM

- A. U.S. Gypsum Co.
- B. Other acceptable manufacturers offering equivalent products:
 - 1. Pabco Gypsum Co.
 - 2. Domtar America, Inc.
 - 3. Gold Bond Building Products.
 - 4. Georgia-Pacific Corp.
 - 5. National Gypsum.

6. Or approved equal.

2.02 GYPSUM BOARD MATERIALS

- A. **Type 1 – Regular:** Regular Firecode Cores Gypsum Wallboard: ASTM C1396, ASTM C840, 5/8 inch thick, Firecore Core (Type X), maximum permissible length; ends square cut, tapered edges. USG Model No. WB1473.
 1. Provide at all ceiling and soffit locations and at wall locations not specified to receive other wallboard types.

2.03 ACCESSORIES

- A. Acoustical Sealant: Non hardening, non-skinning, for use in conjunction with gypsum board; "Acoustical Sealant" manufactured by Tremco.
- B. Corner Beads: Fine mesh expanded metal wing type, zinc coated in conformance with ASTM A525, G90 coating designation.
- C. Edge Trim: GA 216; Type "J" bead.
- D. Joint Materials: GA 216; reinforcing tape, joint compound, adhesive, water, and fasteners.
- E. Fasteners: General provide specific fasteners required for fire rated assemblies.
 1. Use Type S screws for gypsum board attachment to light steel framing.
 2. Use Type S screws for gypsum board attachment to 20 gauge and heavier steel framing.
 3. Use Type W screws for gypsum board attachment to wood framing.
 4. Use Type G screws for gypsum board attachment to gypsum board.
 5. Use Annular ring nails, conforming to ANSI/ASTM C514, sufficient length to provide a minimum of 3/4 inch penetration into framing members.
- F. Setting Compound: Durabond as manufactured by USG. For use at all locations where gypsum board is in direct contact with concrete curbs.
- G. High build PVA Primer: Kelly More Level 5 Interior PVA Primer, USG First Coat Primer, or approved equal.
- H. Electrical Box Sealer: Lowry's "Electrical Box Pads", 6" x 8" x 1-1/8" resilient sealer pads.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.
- B. Check framing for accurate spacing and alignment.
- C. Do not proceed with installation of wallboard until deficiencies are corrected and surfaces to receive wallboard are acceptable.
- D. The Painting Contractor shall not be required to accept the gypsum wallboard installation until after they have applied sealer. At that time, they shall inspect the installation and report to the General Contractor, with a letter to the Architect, of any surface damage, defects, or uneven walls. Uneven walls shall mean those that are not straight, plumb or of an even, true plane. All such discrepancies shall be the responsibility of gypsum wallboard installer and shall be corrected by them prior to application of further wall decoration.
- E. Beginning of installation means acceptance of existing surfaces substrate.

3.02 ACOUSTICAL ACCESSORIES INSTALLATION

- A. Install acoustical sealant within partitions in accordance with manufacturer's instructions.
- B. Install resilient sealer pads over backs and sides of electrical junction boxes.

3.03 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in accordance with GA 216 and ASTM C840.
- B. Erect single layer standard gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Use screws when fastening gypsum board to metal furring or framing, or 1x framing.
- D. Use screws when fastening gypsum board to wood furring or framing.
- E. Fasteners for all vertical gypsum boards shall be placed at 8" at the perimeter and 12" in field U.O.N. on drawings.
- F. Treat cut edges and holes in moisture resistant gypsum board with sealant.
- G. Place control joints consistent with lines of building spaces as indicated by Architect.
- H. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

- I. Contractor shall provide new mud ring extensions for all electrical switch and outlets to allow device to flush with face of new gypsum board surface.
- J. At all locations where gypsum board extends past bottom sill plate and contacts face of curb, apply Durabond product to back side of gypsum board per manufacturer's recommendations to secure to face of concrete curb. Provide moderate pressure and temporary nailing or shoring to ensure adequate bond.

3.04 JOINT TREATMENT AND FINISH TEXTURE

- A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
- B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.
- C. All spaces not further identified below which are scheduled to receive finish painting shall be finished to Level 5 as described by the USG Corporation and receive a spray applied, LIGHT orange peel texture. Texture shall be light, tight and uniform.
- E. All hard lid gypsum wallboard ceilings shall be finished to Level 5.
- G. All exposed gypsum board surfaces and surfaces behind Fiber Reinforced Laminate (FRL) wall coverings shall be finished to Level 5 as described by the USG Corporation with no texture. A spray applied primer surfacer is not acceptable as an alternative to providing required levels of troweled compound and thorough sanding. Poor wall finish will telegraph through FRL.

3.05 TOLERANCES

- A. Maximum Variation from True Flatness: 1/8 inch in 10 feet in any direction.

3.06 ADJUST AND CLEAN

- A. Cleaning and Repair: Clean surfaces that have been spotted or soiled during wallboard application. Contractor shall clean all light fixture lenses, fire alarm devices, electrical outlets, as performing work.
- B. Defective Work: Remove and replace defective work which cannot be satisfactorily repaired, at the direction of the Architect, with no additional cost to the Owner.
- C. Protection: Protect installed work against damage from other construction work.

3.07 CLEAN-UP

- A. Upon completion of the work under this Section, remove all surplus material, rubbish and debris from the premises and leave floors "broom clean".

END OF SECTION

**SECTION 09 51 00
ACOUSTICAL CEILINGS**

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Lay-in acoustical ceiling systems and metal suspension system.

B. Related Requirements:

1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
2. Section 05 40 00: Cold Formed Metal Framing.
3. Section 09 29 00: Gypsum Board.
4. Division 23: HVAC.
5. Division 26: Electrical.

1.02 REFERENCES

- A. Conform to California Building Code (CBC) 2022 requirements and UL - Tunnel Test for Fire Hazard Classification of Building Materials.
- B. Cisca: Acoustical Ceilings Use and Practice.
- C. Division of the State Architect: Comply with requirements of IR 25-2.10.
- D. ASTM A641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
- E. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- F. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- G. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- H. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

- J. ASTM E580 – Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.
- K. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.
- L. ASTM E1414 - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
- M. ASTM E1477 - Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
- N. ASCE 7 - Minimum Design Loads for Buildings and Other Structures, as amended by CBC 1615A.1.16.
- O. CHPS Low-Emitting Materials Table: Materials submitted must be listed as low emitting on the CHPS website, www.CHPS.net.

1.03 SUBMITTALS

A. Samples:

1. Lay in panels of each specified type, 6-inch by 6-inch minimum size.
2. Suspension System: 12-inch-long samples of suspension system members, connections, moldings and wall angles, for each color specified.

B. Shop Drawings:

1. Indicate complete plan layouts and installation details.
2. Indicate related Work of other sections which is installed in, attached to, or penetrates ceiling areas, such as air distribution and electrical devices.

C. Product Data:

1. Suspension System for Lay-in Ceiling: Printed data for suspension system components, including load tests, indicating conformance to specified tests and standards.
2. Acoustical units: Printed data indicating conformance to specified tests and standards.

- D. Maintenance Materials: Provide extra panels equal to 1 percent of the area of each typical module size of acoustical panel, but not less than eight (8) of each specified size, style and color.

1.04 QUALITY ASSURANCE

- A. Ceiling systems shall consist of lay-in acoustical ceiling panels by a single manufacturer and suspension systems by a single manufacturer for the entire project.

- B. Qualifications of Installer: Minimum five (5) years' experience in installing acoustical ceiling systems of the types specified.

C. Design Criteria:

1. Deflection of finished surface to 1/360 of span or less.
2. 1/8-inch maximum permissible variation from true plane measured from 10-foot straightedge placed on surface of finished acoustical fiber units.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the Project site in original sealed packages.
- B. Storage: Store materials in building area where they will be installed, in original package. Keep clean and free from damage due to water or deteriorating elements.
- C. Handle in a manner to prevent damage during storage and installation.

1.06 PROJECT CONDITIONS

- A. Installation of acoustical ceiling system shall not begin until the building is enclosed, permanent heating and cooling is in operation, and residual moisture from plaster and concrete work has dissipated. Building areas to receive ceilings shall be free of construction dust and debris.
- B. Environmental Requirements: Maintain temperature in space at 55 degrees F or above for 24 hours before, during, and after installation of materials.
- C. Scheduling:
 1. Before concealing Work of other sections, verify required tests and inspections have been completed.
 2. Coordinate with related Work of other sections. Coordinate location and symmetrical placement of air distribution devices, electrical devices, and penetrations with related Work section.

1.07 WARRANTY

- A. Manufacturer shall provide a 10-year material warranty.
- B. Installer shall provide a two (2) year fabrication and installation warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. USG Corporation.
- B. Armstrong World Industries.
- C. TURF Design.

D. Or Approved Equal.

2.02 SUSPENSION SYSTEM

- A. Metal suspension system for acoustical lay-in tile shall be hot-dipped galvanized steel conforming to ASTM A653. Main beams and cross tees shall be double-web steel construction with exposed flange design, with factory punched cross tee slots, hanger holes and integral couplings.
- B. Metal suspension system for acoustical lay-in tile shall conform with ASTM C635, C636 and E580 and section 13.5.6 of ASCE 7, as amended by CBC Section 1615A.1.16, for installation in high seismic areas.
- C. Structural classification of suspension systems shall be heavy-duty in conformance to ASTM C635.
- D. Vertical Strut: USG Donn Compression Post, or equal, or as indicated; types and designs complying with requirements of authorities having jurisdiction and seismic Zones D, E and F requirements. Provide base attachment clip for connection of vertical strut to main beams.
- E. Wall Molding: Fabricated from galvanized steel with 2-inch horizontal leg and hemmed edges, same finish as main and cross tees.
- F. Spacer/Stabilizer Bars: Provide for tying together the ends of main runners and cross tees that are not attached to wall molding.
- G. Hanger Wire: 0.106-inch diameter (0.144-inch diameter for pendant fixtures), galvanized soft annealed mild steel wire as defined in ASTM A641, Class 1 coating.
- H. Provide attachment devices and any other required accessories for a complete suspended ceiling system installation.

2.03 ACOUSTICAL CEILING PANELS

- A. Acoustical ceiling panels shall be class A in accordance to ASTM E1264.
- B. Acoustical panels shall meet the following surface-burning characteristics when tested in accordance to ASTM E84 for Class A materials:
 - 1. Maximum Flame Spread: 25.
 - 2. Maximum Smoke Developed: 50.
- C. Mold and Mildew Resistance: Panels and faces shall be treated with a biocide paint additive or an antimicrobial solution to inhibit mold and mildew.

2.04 CEILING TYPES

- A. **Entry Lobby**

1. Acoustical Ceiling Panels:
 - a. Panel Name: **Armstrong #1717 Fine Fissured High NRC**, or equal.
 - b. Panel Size: 2-foot by 2-foot.
 - c. Panel Thickness: 3/4 inch.
 - d. Edge Detail: Tegular.
 - e. Light Reflectance: 0.82 minimum, complying with ASTM E1477.
 - f. CAC: Minimum 40, UL Classified, complying with ASTM E1414.
 - g. NRC: Minimum 0.70, UL Classified, complying with ASTM C423.
 - h. Color: White.
 - i. Recycled Content: Per Manufacturer.
2. Suspension System:
 - a. Suspension System Name: **Prelude XL by Armstrong, Donn DX by USG, 1200 Seismic Series** by Chicago Metallic Corporation, or equal.
 - b. Color: White.

2.05 CEILING ACCESS PANEL

- A. Non-rated, 24"x48", flush mounted, .063 inch thick aluminum access panel with continuous piano hinge and cam locks. Access panel shall be single unit sized to fit in t-bar grid system. Finish shall be electrostatically applied baked white enamel over rust inhibiting phosphate treated steel. Product shall be equal to Williams Brothers Corporation of America, WB-TB Drop-in Ceiling Access Door. Locate in ceiling system to provide access to above ceiling mechanical equipment.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Furnish layouts for inserts, clips or other supports and struts required to be installed by the Work of other trades that depend on the suspended ceiling system for support.
- B. Coordinate related Work to ensure completion prior to installation of clips or fasteners.
- C. Compare layouts with construction conditions. Tile shall be spaced symmetrically about the centerlines of the room or space, and shall start with a tile or joint line as required to avoid narrow tiles at the finish edges unless indicated otherwise. Joints shall be tight with joint lines straight and aligned with the walls. Ceiling moldings shall be provided where tile abuts wall with matching caulking to eliminate any space.

3.02 INSTALLATION

- A. Suspension Systems
 1. Install suspension system in accordance with ASTM C636 and ASTM E580.

2. System shall be complete; with joints neatly and tightly joined and securely fastened; suspension members shall be installed in a true, flat, level plane.
3. Hanger Wires: 0.106-inch diameter minimum; larger sizes as indicated or required.
 - a. Fasten wires to panel points and structure above per most stringent requirements of fabricator and CBC and as indicated on Drawings.
 - b. Wires exceeding 1:6 out-of-plumb shall be braced with counter-sloping wires.
 - c. Maintain wires at least 6 inches from non-braced ducts, pipes, conduits, and other items.
 - d. Install wire along main runners at 4 feet on center. Terminal ends of each main runner and cross tee must be supported within 8 inches of each wall with a perimeter wire or within 1/4 of the length of the end tee, whichever is least, for the perimeter of the ceiling area.
 - e. Where obstructions prevent direct suspension, provide trapezes or equivalent devices; 1 1/2-inch minimum cold rolled channels back-to-back may be installed for spans to 6 feet maximum.
 - f. Wire shall be straight, without extraneous kinks or bend. Hanger wire connections must be capable of carrying a 200 - pound pull without stretching or shifting the suspension clip.
4. Bracing Wires to Resist Seismic Forces: 0.106-inch diameter minimum, larger sizes as indicated or required.
 - a. System for Bracing Ceilings: Lay-in Ceiling Systems: Install one (1) 4 wire set of sway bracing wires and a vertical strut for each 144 square feet maximum of ceiling area. Locate wire sets and struts at 12 feet maximum on center. At ceiling perimeters, wire-sets shall be installed within 6 feet of walls.
 - b. Install 4-wire sets and struts within 2 inches of cross-runner intersection with main runner; space wires 90 degrees from each other.
 - c. Do not install sway bracing wires at an angle greater than 45 degrees with the ceiling plane.
 - d. Wires shall be tight, without causing ceiling to lift.
 - e. Fasten struts in accordance with CBC requirements.
 - f. Maintain wires at least 6 inches from non-braced ducts, pipes, conduit, and other items.
5. Provide additional wires, 0.106-inch diameter minimum, necessary to properly support suspension at electrical devices, air distribution devices, vertical soffits, and other concentrated loads.
6. Suspension:
 - a. Suspension members shall be fastened to two (2) adjacent walls per ASTM 580; but shall be at least 3/4 inches minimum clear of other walls.
 - b. Any suspension members not fastened to walls shall be interconnected to prevent spreading, near their free end, with a horizontal metal strut or stabilizer bar or 0.064-inch diameter taut tie wire.
 - c. Provide additional tees or sub tees to frame openings for lights, air distribution devices, electrical devices, and other items penetrating through ceiling, which do not have an integral flange to support and conceal cut edges of acoustic panels. Provide cross bracing necessary to securely support any surface mounted fixtures or other items.
7. Attachment of Wires:

- a. To Metal Deck or Steel Framing Members: Install as required by current code.
 - b. To Suspension Members: Insert through holes in members or supporting clips.
 - c. Wires shall be fastened with three (3) tight turns minimum for hanger wires and four (4) tight turns minimum bracing wires. Turns shall be made in a 1 ½-inch maximum distance.
- B. Suspension System for 2-foot by 2-foot Lay-in Acoustical Ceilings:
1. Main Runners: Install main runners 48 inches apart; 0.106-inch diameter hanger wires space 48 inches on center maximum along runners, and within 8 inches of ends.
 2. Install wall moldings with fasteners to studs. Install corner caps at molding intersections.
 3. Cross Tees: Install between main runners in a repetitive pattern of 2-foot spacings.
 4. Sub-Tees: Install at edges of penetrations.
- C. Acoustical Panels
1. Install panels into suspension system. Partial panels shall be neatly cut and fitted to suspension and around penetrations and/or obstructions. Duplicate tegular edges at partial panels; cuts to be straight. Repaint cut tiles to match color or as directed by manufacturer for mylar facing at visually exposed conditions or as required by the Architect.
 2. Penetrations through the ceilings for sprinkler heads and other similar devices that are not integrally tied to the ceiling system in the lateral direction shall have a 2-inch oversized ring, sleeve or adapter through the ceiling tile to allow free movement of 1 inch in horizontal directions. Alternatively, per ASTM E580, a flexible sprinkler hose fitting that can accommodate 1 inch of ceiling movement shall be permitted to be used in lieu of the oversized ring, sleeve or adapter.
- D. Air Distribution Devices
1. Refer to and coordinate with Division 23 - HVAC.
 2. Install air distribution grilles and other devices into suspension system. Install 4 taut wires, each 0.106-inch diameter minimum, to each device within 3 inches of device corners, to support their weight independent of the suspension system.
- E. Light Fixtures
1. Refer to and coordinate with Division 26 - Electrical.
 2. Fixtures weighing less than 56 pounds: Install fixtures into suspension systems and fasten earthquake clips to suspension members. Install minimum 2 slack safety wires, each 0.106 inch diameter minimum, to each fixture at diagonally opposite corners, to support their weight independent of the system.
 3. Fixtures weighing 56 pounds or more: Install fixtures into suspension system and fasten earthquake clips to suspension system members as required by the Drawings and/or code. Install not less than 4 taut 0.106-inch diameter wires capable of supporting four (4) times the fixture load.
 4. Support pendant-mounted light fixtures directly from the structure above with hanger wires or cables passing through each pendant hanger and capable of supporting two (2) times the weight

of the fixture. Brace the pendant-mounted light fixtures by either a bracing assembly at the ceiling penetration or below the ceiling to the walls, as indicated in the drawings.

3.03 CLEANING

- A. General: After installation of acoustical material has been completed, clean surfaces of the material, removing any dirt or discolorations. Replace panels as required.
- B. Acoustical Panels: Minor abraded spots and cut edges shall be touched up with the same paint as was used for factory applied finish of the lay-in panels.
- C. Remove and replace work that cannot be successfully cleaned and repaired to eliminate evidence of damage.
- D. Remove rubbish, debris, and waste materials and legally dispose of off of the Project site.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 09 70 00
VINYL WRAPPED TACK PANELS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Factory-wrapped vinyl covered tackable wall panels.

1.02 RELATED SECTIONS

- A. The Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 09 29 00: Gypsum Board Systems.

1.03 SAMPLE

- A. Submit a sample of each type and color to be installed for the architect's approval.

1.04 CERTIFICATE OF COMPLIANCE

- A. Submit manufacturer's certification that wallcovering furnished meets or exceeds the architect specification requirements.

1.05 WARRANTIES

- A. Furnish a written warranty against defective workmanship that may develop within one (1) year from date of installation and 5 years against manufacturing defects.

1.06 PRODUCT DELIVERY STORAGE AND HANDLING

- A. Deliver vinyl wallcovering and adhesive to the job site in unbroken or undamaged containers and clearly marked with the supplier's identification label. Store vinyl wall coverings in a flat position to avoid damage to roll ends. Store materials in a clean, dry storage area with temperature maintained above 55 F with normal humidity. **DO NOT CROSS STACK THIS MATERIAL.**

1.07 PROJECT CONDITIONS

- A. Areas where wallcovering will be installed shall have a constant minimum temperature of not less than 60 degrees F for at least seven days prior to and throughout installation period and for seven days thereafter.

PART 2 – PRODUCTS

2.01 VINYL WALLCOVERING

- A. Manufacturer: **Koroseal** (specified).
- B. Pattern/Color: **Ceres, Desert Sand, Orleans, Insight** and similar patterns, textures and colors from Koroseal School line and similar. Actual product line and colors to be selected by architect at time of submittal.
 - 1. Provide for (2) Koroseal product lines and up to (2) colors from each line to be distributed throughout the project.
- C. Vinyl Wallcovering shall meet Federal Specification CCC-W-408A and the CFFA-W-101-D, Quality Standard for Vinyl Coated Fabric Wallcovering and shall contain mildew inhibitors.
 - 1. Total Weight: 21.0 oz PLY.
 - 2. Roll Width: 54 in.
 - 3. Type/Fire rating: Type II / Class A.
 - 4. Gauge: 23 mils.
 - 5. Fabric backing: Osnaburg.
 - 6. Tensile (Minimum): 50 x 55 lb.
 - 7. Tear (Minimum): 25 x 25.
 - 8. Federal Spec: CCC-W-408A, Type II.
 - 9. CFFA Spec: CFFA-W-101-D, Type II.
 - 10. Fire Testing: NFPA 101 Life Safety Code.
NFPA A255 (UL 723, CAN S102M) Tunnel Test Class A Rating. NFPA 286 Corner Burn Test Meets Requirements for Flame Spread, Smoke Developed and Flashover. UL Labeled and Listed.
 - 11. Repeat: Vertical - N/A.
Horizontal - N/A.
Match Information - Random Match, Reverse Hang.

2.02 BURNING CHARACTERISTICS

- A. The manufacturer shall certify at the time of shipment that the materials furnished meet the published flame spread and smoke development Fire Hazard Classification Rating(s) of those products when tested according to ASTM-E84-10 Tunnel Test.

2.03 UL LABEL

- A. All products shall be UL labeled assuring complete compliance with all specifications and requirements through continuous inspection by UL inspectors.

2.04 FIRE DETECTION CHARACTERISTICS

- A. The vinyl wallcovering shall contain the Early Warning Effect formulation which provides early warning to potential fire conditions. The vinyl wallcovering shall contain thermoparticulating ingredients which, when heated to approximately 300 degrees F, emit a colorless, odorless, vapor that activates ionization smoke detection when

installed according to manufacturer's specifications. Evidence of the Early Warning Effect shall be based on the ASTM E603-07 standards guide for room fire experiments.

2.05 PROTECTIVE COATING

- A. The vinyl wallcovering shall have a protective coating applied to its surface to minimize migration of stains into the vinyl and, therefore, offer stain protection from a variety of staining agents and provide greater ease of clean ability.

2.06 ADHESIVE

- A. The adhesive used must be manufacturer's recommended adhesive and must contain mildew inhibitors. When applied to 5/8" Type-X gypsum board, A-848-B adhesive is recommended by manufacturer.

2.07 PRIMERS

- A. The primer used must be manufacturer's recommended primer.

2.08 TACKABLE PANEL SUBSTRATE

- A. Tackable Panels: Where indicated on the Drawings, vinyl shall be installed over tackable substrate. Tackboard substrate shall be industrial insulation board 1/2", equal to Homasote, by full height of wall or as otherwise indicated on the drawings, and shall be manufactured specifically as a substrate for vinyl covered wall panels.
- B. The board shall be asphalt free, shall have an ironed-on coating, and have a density of 16 pounds per cubic foot.
- C. Edges are square without bevel.
- D. The vinyl wallcovering shall be mechanically laminated, with the long edges wrapped to the back of the tackboard. The vinyl covered tackboard shall be a Class II flame spread rating.

2.09 EDGE TRIM

- A. Provide color-matched PVC J-mold edge trim at all exposed exterior edges.

2.10 GYPSUM BOARD FINISH

- A. The recommended finish level before commercial-grade wall covering is applied for final decoration is Level 4. The prepared surface shall be coated with a drywall primer prior to the application of final finishes. See 2.07 Primers.
- B. At locations to be covered by a tackable panel substrate, the gypsum board finish shall be Level 2.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Installer shall inspect all areas and conditions under which vinyl wallcoverings are to be installed. Installer shall notify the contractor and architect in writing of any conditions detrimental to the proper and timely completion of the installation; work will proceed only when conditions have been corrected and accepted by the installer.
- B. Substrate shall be checked with a suitable "Moisture Meter." Moisture shall not exceed 4%.

3.02 SURFACE PREPARATION

- A. Wall surfaces shall be free from defects and imperfections that could show through the finished covered surface.
- B. For new drywall construction, manufacturer recommended primer should be used before application of wallcovering for ease of future removal when redecorating.
- C. All painted surfaces should be evaluated for the possibility of pigment bleed-through. If there is any possibility, a coat of sealer, recommended by the manufacturer, should be applied before application of the wallcovering.

3.03 INSTALLATION

- A. Wallcovering shall be installed by experienced workers and contractors in strict accordance with the manufacturer's oriented instructions using vinyl wallcovering adhesive recommended by the manufacturer (WHEAT PASTE SHALL NOT BE USED). It is absolutely imperative that installer read the manufacturer's instruction sheet in each roll before installing the vinyl wallcovering. Permanent building light shall be available for installation.
- B. Installer before cutting shall examine pattern and color and determine that they are the correct pattern and color as specified.
- C. Installer shall install each roll in sequence starting with largest roll number and each strip in same sequence as cut from roll. If pattern is not random, examine for repeat design. Some patterns should be lined up, matched or reversed for best results. If necessary trim selvage deep enough to assure color uniformity.
- D. After application of three strips, an inspection should be made and if there are any variations in color or pattern which are felt to be excessive, the wallcovering distributor or manufacturer's representative should be notified for his inspection before any further wallcovering is installed.
- E. Always bring material six (6) inches around inside and outside corners being sure to fit into corners to avoid bridging or spanning.

- F. The wallcovering should be smoothed to the hanging surface with a stiff bristled sweep brush or a flexible broad-knife to eliminate air bubbles.
- G. Remove excess adhesive along finished seam immediately after each wallcovering strip is applied. Use of clean, warm water, a natural sponge and clean towels are recommended for this use. It is very important to change water often to maintain cleanliness.
- H. Install all exposed edges using J-mold trims.

3.04 CLEAN-UP COMPLETION

- A. Upon completion of work, remove surplus materials, rubbish and debris, resulting from the wallcovering installation. Leave areas in neat, clean and order condition.

END OF SECTION

SECTION 09 91 00
PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Surface preparation and field painting of exposed interior items and surfaces, including mechanical and electrical equipment that do not have a factory-applied finish.

1.2 RELATED SECTIONS

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
- B. Section 09 29 00 - Gypsum Board Assemblies: Surface preparation of gypsum board.
- C. Division 26: Electrical.

1.3 REFERENCES

- A. ASTM International (ASTM): ASTM D 16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
- B. Steel Structures Painting Council (SSPC) SP6 - Commercial Blast Cleaning Procedures.
- C. Steel Structures Painting Council (SSPC) SP10 - Near White Blast Cleaning Procedure.

1.4 DEFINITIONS

- A. General: Standard coating terms defined within Masters Painters Institute (MPI) manual.
 - 1. Gloss level 1 - Flat with a gloss range below 5 when measured at a 60-degree meter and 10 when measured at an 85-degree meter.
 - 2. Gloss level 2 - Low Sheen with a gloss range of 5 to 10 when measured at a 60 degree meter and 10 to 35 when measured at an 85 degree meter.
 - 3. Gloss level 3 - Eggshell with a gloss range between 10 and 15 when measured at a 60-degree meter and 10 to 35 when measured at an 85-degree meter.
 - 4. Gloss level 4 - Satin with a gloss range between 25 to 35 when measured with a 60 degree meter.
 - 5. Gloss level 5 - Semi-Gloss with a gloss range between 50 and 55 when measured at a 60 degree meter.
 - 6. Gloss level 6 - Gloss with a gloss range more than 70 when measured at a 60 degree meter.

1.5 SUBMITTALS

- A. General: Submit in accordance with Conditions of the Contract and Division 1 Specification sections.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Preparation instructions and recommendations.
 - 3. Manufacturer's Information: Manufacturer's technical information, including label

analysis and instructions for handling, storing, and applying each coating material.

- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.
- C. Paint Exposed Surfaces: If an item or a surface is not specifically mentioned, paint the item, or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
- D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
- E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label:
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain storage containers in a clean condition, free of foreign materials and residue.
- C. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- D. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F (10 and 32 deg C), unless manufacturer's instructions specifically states.
- E. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F (7 and 35 deg C).
- F. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.8 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied and, in the quantities, described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
- B. Quantity: Furnish Owner with an additional three percent, but not less than 1 gal (3.8 l) or 1 case, as appropriate, of each material and color applied.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Dunn Edwards Paints.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 25 13.

2.2 PAINT MATERIALS - GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. VOC Classification: Provide materials, including primers, undercoats, and finish-coat materials, which meet local air quality management district regulations.
- C. Color: Refer to Finish Schedule and Paint Legend for paint colors.
- D. Application Rate: Coating thickness for primer, intermediate, barrier and finish coats shall be measured as Dry Film Thickness (DFT) and comply with manufacturer's published recommendations.

2.3 Interior Paint Systems

- A. Gypsum and Plaster Walls:
 - a. Prime Coat: DE Ultra – Grip Acrylic Premium Primer
 - b. 2nd Coat: DE Spartawall Acrylic Low VOC Eggshell Enamel
 - c. 3rd Coat: DE Spartawall Acrylic Low VOC Eggshell Enamel
- ~~B. Suspended and Surface applied Ceilings:
 - a. Prime Coat: DE Ultra – Grip Acrylic Premium Primer
 - b. 2nd Coat: DE Ceiling Paint Flat Finish
 - c. 3rd Coat: DE Ceiling Paint Flat Finish~~
- ~~C. Wood Doors & Frames (Painted Finish):
 - a. Prime Coat: DE Ultra Grip Acrylic Premium Primer
 - b. 2nd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel
 - c. 3rd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel~~
- ~~D. Previously Painted Wood:
 - a. Prime Coat: DE Ultra-Grip Acrylic Premium Primer
 - b. 2nd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel
 - c. 3rd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel~~
- ~~E. Wood Previously Stained to be Painted:
 - a. Prime Coat: DE Ultra – Grip Acrylic Premium Primer~~

- b. 2nd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel
- c. 3rd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel

- F. — Wood to be re-finished and sealed:
 - a. 2 Coats: Old Masters Master Armor Satin Finish
- G. — Metal Doors and Frames:
 - a. Prime Coat: DE Ultra-Grip Acrylic Premium Primer
 - b. 2nd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel
 - c. 3rd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel
- H. — Vinyl Tackable wall Panels:
 - a. Prime Coat: Zinsser B-I-N Shellac Base Primer
 - b. 2nd Coat: DE Spartawall Acrylic Low VOC Eggshell Enamel
 - c. 3rd Coat: DE Spartawall Acrylic Low VOC Eggshell Enamel

2.4 Exterior Paint Systems

- A. — Concrete Substrates, Masonry, Stucco, Non-Traffic Surfaces:
 - a. Prime Coat: DE Ultra-Grip Acrylic Premium Primer
 - b. 2nd Coat: DE Spartashield 100% Acrylic Exterior Eggshell Finish
 - c. 3rd Coat: DE Spartashield 100% Acrylic Exterior Eggshell Finish
- B. — Wood Siding:
 - a. Prime Coat: DE Ultra-Grip Acrylic Premium Primer
 - b. 2nd Coat: DE Spartashield 100% Acrylic Exterior Eggshell Finish
 - c. 3rd Coat: DE Spartashield 100% Acrylic Exterior Eggshell Finish
- C. — Wood Fascia:
 - a. Prime Coat: DE Ultra-Grip Acrylic Premium Primer
 - b. 2nd Coat: DE Spartashield 100% Acrylic Exterior Semi-Gloss Finish
 - c. 3rd Coat: DE Spartashield 100% Acrylic Exterior Semi-Gloss Finish
- D. — Wood Benches:
 - a. Prime Coat: DE Ultra-Grip Acrylic Premium Primer
 - b. 2nd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel
 - c. 3rd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel
- E. — Interior & Exterior Surfaces of Exterior Doors:
 - a. Prime Coat: DE Ultra-Grip Acrylic Premium Primer
 - b. 2nd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel
 - c. 3rd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel
- H. — Door Mullions at Pair Doors:
 - a. Prime Coat: DE Ultra-Grip Acrylic Premium Primer
 - b. 2nd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel
 - c. 3rd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel
- I. — Painted Infill Panels at window Locations:
 - a. Prime Coat: DE Ultra-Grip Acrylic Premium Primer
 - b. 2nd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel
 - c. 3rd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel
- J. — Ferrous Metal Substrates:
 - a. Prime Coat: DE Enduraprime High Performance Acrylic Metal Primer

- ~~b. 2nd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel~~
- ~~c. 3rd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel~~

- ~~K. Metal Handrails, Guardrails, Barricade Rails & Fencing:~~
 - ~~a. Prime Coat: For Ferrous Metal- DE Enduraprime High Performance Acrylic Metal Primer and for Galvanized Metal – DE Ultra-Shield Galvanized Metal Primer~~
 - ~~b. 2nd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel~~
 - ~~c. 3rd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Enamel~~

- ~~L. Metal Panels Fascia:~~
 - ~~a. Prime Coat: DE Surfaco Chalk Binding Primer~~
 - ~~b. 2nd Coat DE Spartashield 100% Acrylic Exterior Semi-Gloss Finish~~
 - ~~c. 3rd Coat: DE Spartashield 100% Acrylic Exterior Semi-Gloss Finish~~

- ~~M. Metal Gates:~~
 - ~~a. Primer Coat: DE Enduraprime High Performance Acrylic Metal Primer~~
 - ~~b. 2nd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Finish~~
 - ~~c. 3rd Coat: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss Finish~~

- ~~N. Gutters, downspouts, Cap & Edge Flashings:~~
 - ~~a. Prime Coat: DE Ultra-Grip Acrylic Premium Primer~~
 - ~~b. 2nd Coat: DE Spartashield 100% Acrylic Semi-Gloss Finish~~
 - ~~c. 3rd Coat: DE Spartashield 100% Acrylic Semi-Gloss Finish~~

- ~~O. Canopies Including Undersides:~~
 - ~~a. Prime Coat: For Ferrous Metal- DE Enduraprime High Performance Acrylic Metal Primer or for Galvanized Metal DE Ultrashield Galvanized Primer~~
 - ~~b. 2nd Coat: DE Enduracoat High Performance Semi-Gloss Finish~~
 - ~~c. 3rd Coat: DE Enduracoat High Performance Semi-Gloss Finish~~

- ~~P. Extended Roof Overhangs and Covered Walks Including Undersides:~~
 - ~~a. Prime Coat: DE Ultra-Grip Acrylic Premium Primer~~
 - ~~b. 2nd Coat: DE Spartashield 100% Acrylic Exterior Eggshell Finish~~
 - ~~c. 3rd Coat: DE Spartashield 100% Acrylic Exterior Eggshell Finish~~

- ~~Q. Flag Poles:~~
 - ~~a. Prime Coat: DE Enduraprime High Performance Acrylic Metal Primer or for Galvanized Metal DE Ultrashield Galvanized Primer~~
 - ~~b. 2nd Coat: DE Enduracoat High Performance Semi-Gloss Finish~~
 - ~~c. 3rd Coat: DE Enduracoat High Performance Semi-Gloss Finish~~

- ~~R. Relocatable Classroom Buildings and Skirts:~~
 - ~~a. Prime Coat: DE Ultra-Grip Acrylic Premium Primer~~
 - ~~b. 2nd Coat: DE Spartashield 100% Acrylic Exterior Eggshell Finish~~
 - ~~c. 3rd Coat: DE Spartashield 100% Acrylic Exterior Eggshell Finish~~

- ~~S. Relocatable Building Ramp Skirts & Handrails:~~
 - ~~a. Prime Coat: DE Ultra-Grip Acrylic Premium Primer~~
 - ~~b. 2nd Coat: DE Spartashield 100% Acrylic Exterior Eggshell Finish~~
 - ~~c. 3rd Coat: DE Spartashield 100% Acrylic Exterior Eggshell Finish~~
 - ~~d. Handrail's: 2 Coats: DE Aristoshield Water Based Urethane Alkyd Semi-Gloss~~

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.
 - 2. If a potential incompatibility of primers applied by others exists, obtain the following from the primer Applicator before proceeding:
 - a. Confirmation of primer's suitability for expected service conditions.
 - b. Confirmation of primer's ability to be top coated with materials specified.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
 - 1. Provide barrier coats over incompatible primers or remove and reprime.
 - 2. Provide barrier coats over incompatible primers or remove primers and reprime substrate.
 - 3. Cementitious Substrates: Prepare concrete, brick, concrete masonry block, and cement plaster surfaces to be coated. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to dull surfaces. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surfaces.
 - a. Use abrasive blast-cleaning methods if recommended by coating manufacturer.
 - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not coat surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
 - 4. Wood Substrates: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Smoothly sand surfaces exposed to view and dust off.
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer, before applying primer.
 - b. Immediately on delivery, prime edges, ends, faces, undersides, and backsides of wood to be coated.
 - c. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - d. Determine moisture content of surfaces by performing a moisture test. Do not coat if moisture content exceeds 15 percent.
 - 5. Ferrous-Metal Substrates: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC

recommendations.

- a. Blast-clean steel surfaces as recommended by coating manufacturer and according to SSPC-SP 10.
 - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire brush, solvent clean, and touch up with same primer as the shop coat.
6. Nonferrous-Metal Substrates: Clean nonferrous and galvanized surfaces according to manufacturer's written instructions for the type of service, metal substrate, and application required.
- a. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- D. Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
 2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
 3. Use only the type of thinners approved by manufacturer and only within recommended limits.
 4. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
- B. General: Apply high-performance coatings according to manufacturer's written instructions.
1. Use applicators and techniques best suited for the material being applied.
 2. Do not apply high-performance coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.
 3. Coating surface treatments, and finishes are indicated in the coating system descriptions.
 4. Provide finish coats compatible with primers used.
 5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convactor covers, grilles, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
- C. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. The number of coats and film thickness required is the same regardless of application method.
 2. Completed Work: Match approved Samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

3.4 FIELD QUALITY CONTROL

- A. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:
1. Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed,

and certified in the presence of Contractor.

2. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove non-complying paint from Project site, pay for testing, and repaint surfaces previously coated with the non-complying paint. If necessary, Contractor may be required to remove non-complying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

3.5 CLEANING

- A. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.6 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing, or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
- C. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces.

END OF SECTION

SECTION 10 00 00
MISCELLANEOUS SPECIALTIES

PART 1 – GENERAL

1.01 SECTION INCLUDES:

- A. Provide and install specialty and built-in items as indicated on the Drawings and specified here.
 - 1. Resilient Base.
- B. Provide miscellaneous, and incidental items under the work of this section for all items indicated on the Drawings but not specifically addressed in other sections or not necessarily scheduled herein.

1.02 RELATED SECTIONS:

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.03 STANDARDS:

- A. Individual items or assemblies scheduled or as indicated on the Drawings, shall conform to respective industry and governmental standards.

1.04 QUALITY ASSURANCE:

- A. Installation of items or assemblies shall be by personnel thoroughly trained and experienced in the required skills and completely familiar with respective manufacturer's methods of installation.
- B. CBC, California Building Code - 2022 Edition, as amended.

1.05 SUBMITTALS:

- A. Before any specialty items are delivered to the job site, submit Shop Drawings and catalog cuts with product data in accordance with Section 00 72 00. Show all details of installation and assembly, all requirements for work by other trades, and all colors available from the selected manufacturer in the quality specified.

1.06 DELIVERY, STORAGE AND HANDLING:

- A. Deliver undamaged products or materials to site in manufacturer's sealed containers or wrappings with legends intact. Store on site secure from weather, soil, and physical damage.

PART 2 – PRODUCTS

2.01 GENERAL:

- A. All items or assemblies shall be as scheduled in Article 3.05 of this Section or approved equal items as set forth in Section 00 72 00, covering submission and review of substitutions.
- B. Items which are not scheduled herein and not addressed in other Sections, but are noted or otherwise indicated on the Drawings, will be clarified by the Architect prior to or after the Bid upon the Contractor's request. Such clarification will not be considered as grounds for an increase to the contract cost or to the contract time when such a clarification is requested after the Bid.

PART 3 – EXECUTION**3.01 INSPECTION:**

- A. Coordinate with other trades as required to ensure proper and adequate provision in framing and wall finish for the installation of the selected specialties in the correct locations.
- B. Prior to installation, carefully inspect and verify that the installed work of other trades is complete to the point where this installation may properly commence.
- C. Verify that specified items can be installed in accordance with the approved design.
- D. In the event of discrepancy, immediately notify Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.
- E. Upon completion of installation, and as a condition of acceptance, visually inspect the entire work of this Section, adjust all components for proper alignment and use, and touch up all abrasions and scratches to make them completely invisible.

3.02 INSTALLATION:

- A. Install all specialty items where indicated on the Drawings and in full accordance with all pertinent regulations and the manufacturer's recommendations, anchoring all components firmly in place for long life under hard use.

3.03 PROTECTION:

- A. Protect work and materials of this Section prior to and during installation and protect the installed work and materials of other trades.
- B. In the event of damage, make all repairs and replacements necessary to the satisfaction of the Architect at no additional cost to the Owner.

3.04 CLEAN UP:

- A. Keep building and premises free from accumulated waste materials, rubbish and debris resulting from Work herein. Upon completion of work, remove tools, appliances, surplus materials, waste materials, rubbish, debris, and accessory items used in or resulting from installation, and legally dispose of off-site.

3.05 SCHEDULE OF MISCELLANEOUS SPECIALTIES:

- A. **Rubber Wall Base:** Cove style, conforming to ASTM F 1861 or FS-SS-W-40, Type 1. 6 inch high and 1/8-inch (3.2mm) gauge. No manufactured corners.

END OF SECTION 10 00 00

SECTION 10 14 00
SIGNAGE

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Provision and installation of interior and exterior room and building identification signs, geometric restroom signs, individual raised letters, concrete casting letters, decals, interior and exterior directional and informational signs including signs for accessible features and regulatory signs and support posts

B. Related Sections:

1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
2. Section 08 80 00: Glazing.
3. Section 09 29 00: Gypsum Board.

1.02 REFERENCES

A. Accessible signs shall conform with the following requirements as indicated:

1. California Building Code (CBC) Title 24, 2022 Edition.
2. ADA Accessibility Guidelines (ADAAG, latest adopted edition).
3. Contracted Grade 2 Braille shall be used whenever Braille symbols are specifically required (CBC Section 11B-703.3 Braille).
4. Means of Egress Identification: CBC 11B-216.1 & 11B-703.1.
5. Tactile Exit Signs: CBC 1013.4.
6. Restroom Identification Symbols: CBC 11B-216.8 & 11B-703.7.2.6.
7. Signs and Identification: CBC 11B-216.1 & 11B-703.1.
8. International Symbol of Accessibility: CBC 11B-703.7.2.1.
9. Direction and Information Signs: CBC 11B-703.1.
10. Symbols of Accessibility: CBC 11B-703.7.
11. Finish and Contrast: CBC 11B-703.5.1.
12. Character Proportions: CBC 11B-703.2.4.
13. Character Height: CBC 11B-703.2.5.
14. Raised Characters and Pictorial Symbol Signs: CBC 11B-703.2 & 11B-703.6.
15. Braille: CBC 11B-703.3.
16. Mounting Height and Location: CBC 11B-703.4.1 & 11B-703.4.2.
17. Symbols of Accessibility: CBC 11B-703.7.2.
18. Color of Symbol: CBC 11B-703.7.2.1.
19. Entrance Signs: CBC 11B-216.6.

B. ASTM D4802 - Standard Specification for Acrylic Plastic Sheet.

- C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- E. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar.

1.03 SUBMITTALS

- A. General: Submit in accordance with Conditions of the Contract and Division 1 Specification sections.
- B. Shop drawings listing sign types using the same sign type designations identified in the SIGNAGE SCHEDULES in this Section, lettering and locations and overall dimensions of each sign.
- C. Two (2) samples of typical room identification sign illustrating full size sample sign with tactile characters, Braille and subsurface text or pictogram to demonstrate fabrication technique and Braille measurements which shall be used on proposed project.
- D. Submit manufacturer's technical data and installation for each type of sign required.
- E. Submit samples of background colors, character colors, and one-inch high print outs of "I," "O" and "X" from proposed type styles. Indicate which type styles shall be used for required tactile characters and for required visual characters.
- F. Submit proposed sign schedule to comply with scoping requirements above and clearly identifying all sign types, locations and text. Architect will assist in clarifying room names at time of submittal.
 - 1. Sign type designations in submittal must match those in the SIGNAGE SCHEDULE in this Section.
- G. All signage shall be designed and constructed to comply with signage specifications and drawings.

1.04 QUALITY ASSURANCE

- A. Manufacturers shall have a minimum of five (5) years of documented experience in fabricating and installing both tactile and non-tactile signs and lettering required by this section.
 - 1. Manufacturer's Two-Year Warranties.
- B. Contractor shall provide labor and materials to repair or replace defective signs as directed by Owner during warranty period. Defects shall include:
 - 1. Tactile characters and/or Braille dots which come off or are easily removed.
 - 2. Discoloration, wear and scratching off of the surface color.
 - 3. All signs and sign components, except for damage by mishandling by Owner, including installation by Owner, or vandalism.

C. Pre-installation Meeting

1. Notify Architect when signs are ready for installation. Arrange for conference at job site. Do not proceed with installation until Architect's approval of specific locations and methods of attachment has been obtained.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site and protect from damage. Store until immediately prior to Notice of Completion.
- B. Manufacturers shall submit 3 references showing products for projects completed within the last 6 years. Both tactile and non-tactile signage shall be included in the work.
- C. Manufacture's Two-Year Warranties.
- D. Contractor shall provide labor and materials to repair or replace defective signs as directed by Owner. Defects shall include:
 1. Tactile characters and/or Braille dots which come off or are removed.
 2. Discoloration, wear and scratching off of the surface color.
 3. All signs and sign components, except for damage by mishandling by Owner, including installation by Owner, or vandalism.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products of following manufacturers form basis for design and quality intended.
 1. **Gravotech.** www.gravotech.com
 2. Or approved equal with direct compatibility with District-owned Gravotech engraving equipment and surplus engraving materials for sign types specified as "Modular".

2.02 MATERIALS

- A. **Modular Acrylic Framed Signs (Sign Types S-1 & S-3 per Signage Schedule below):**
 1. Modular sign panels mounted in permanently fixed frames with sign panels capable of being removed and replaced.
 2. ADA Tactile and Braille Signs: Sand-Carved signs; thermosetting high-pressure laminate using Graphic Process Sand-Carved signs, exterior-grade, graphics, Braille and tactile copy required. Square corners, square cut edges, matt finish using **Gravotac** sheet engraving materials as manufactured by Gravotech.

- a. Frame: Single-piece, square-edge modular plastic frames with concealed screw mounting by Gravotech. Color as selected by Architect at time of submittal.
- b. ADA TactManufacturer's standard process for producing copy complying with CBC and ADA Accessibility Guidelines. Text shall be accompanied by California Grade 2 Braille. Produce precisely formed characters with square cut edges free from burrs and cut marks, permanently fused to substrate.
- c. Raised-Copy Thickness: Not less than 1/32 inch.

B. ~~Non-Tactile, Non-Modular Signs (Sign Types S-4 & S-5 per Signage Schedule below):~~

- ~~1. Cast Acrylic Plastic Sheet; ASTM D4802 Category A-1, ¼ inch overall thickness, laminated acrylic plastic sheets, sub-surface screened process graphics and symbols, exterior-grade at exterior locations, square 3/8-inch radius corners, square-cut edge, drilled holes for countersunk screws, polished edges.~~
 - ~~a. Unframed Signs~~
- ~~2. Apply UV inhibitor overcoat for exterior signs.~~

C. ~~Restroom Signs (Sign Type S2 per Signage Schedule below):~~

- ~~1. Staff Men and Staff Women, Girls, Boys and Gender Neutral Restroom Signage:~~
 - ~~a. Doorways leading to these restrooms shall be identified by a combination of a ¼" matt finished colored acrylic polymer material with 12 inch diameter and equilateral triangle 1/4 inch thick raised acrylic with edges 12 inches long, with vertex pointing upward in contrasting color from door color. Sign shall be mounted in center of door 60 inches from finish floor to center of sign.~~
 - ~~b. Room shall be further identified by rectangular colored acrylic polymer matt finished room identification sign ¼ inch thick, 8 inch height by 6 inch length minimum unless indicated on Drawings upon which appears gender appropriate pictogram 6 inches high, and the appropriate text in all CAPS immediately below on the same sign in contrasting color. Letters: 5/8 inches minimum and 2 inches maximum high in contrasting color, raised minimum 1/32 inch fully tactile, accompanied by the California Contracted Grade 2 Braille indicator immediately below. Sign shall be located on wall on latch side of door, 60 inches from finish floor to center of sign, centered horizontally within 18 inch space adjacent to latch side of door or on nearest adjacent wall.~~
 - ~~c. Conform to all CBC requirements, CBC 11B.703.1 and 11B-703.7.2.6.1 (6.2 and 6.3).~~
 - ~~d. See details on drawings for pictograms, text and other design criteria.~~

D. ~~Exterior Site Signs (Sign Types S9 & S-10 per Signage Schedule below):~~

- ~~1. Material: 0.040 inch thick, Type 304 stainless steel or .080 aluminum. All exterior signs to have 0.125" rounded corner radius.~~
- ~~2. Finish: Non-glare (non-reflective) materials shall be used for all signs which identify, direct to, or give information about facilities and their use. Background and text/pictograms shall contrast a minimum of 70%.~~

- a. ~~Exception: Parking, traffic signs, and exterior safety signs may use reflective materials. Identification signs for accessible parking spaces shall use reflective materials for graphics.~~

3. ~~Accessible Parking Stall Sign (See Drawings for locations):~~

- a. ~~Fabricate with metal panel for each accessible parking stall as indicated on the Drawings. The sign shall display the International Symbol of Accessibility (reflectorized); text shall occur below the symbol and read "MINIMUM FINE \$250". The bottom of the regular accessible stall sign shall be mounted 80" above the finish grade. Color shall be white text on blue field. See Drawings for additional information.~~

4. ~~Van Accessible Parking Stall Sign (See Drawings for locations):~~

- a. ~~Same as "Accessible Parking Stall Sign" described above. Install above new "Van Accessible" sign. Color shall be white text on blue field. See Drawings for additional information.~~

5. ~~Accessible Parking Entry Sign (See Drawings for locations):~~

- a. ~~Fabricate with a single post and metal panel at location indicated on the Drawings. The sign shall display the text as described on the Drawings. The bottom of the regular accessible stall sign shall be mounted 80" above the finish grade. Color shall be white text on blue field. See Drawings for additional information.~~

E. Fasteners

1. One-way tamper resistant screw (1.25" minimum, 1" minimum embedment into wall) for wood, masonry or concrete application and self-drilling tamper resistant pan head pin in head Torx (1") for metal application with fastener anchors as appropriate for wall material. All exterior fasteners shall be stainless steel.
2. All interior and exterior signs or sign frames shall be set in full-bed of clear silicone sealant in addition to specified mechanical fasteners. Wipe all squeeze-out for clean appearance.

F. Lettering Type Style

1. All signage shall be **CALIBRI REGULAR**, uppercase letters only unless otherwise indicated for all sign types. Refer to 2.03, REGULATORY REQUIREMENTS FOR FABRICATION below for letter-proportion compliance.

2.03 REGULATORY REQUIREMENTS FOR FABRICATION

A. Fonts and Characters:

1. Numerals and uppercase letters on metal signs will be minimum 1 inch high (vertical dimension unless otherwise shown on Drawings) embossed text and numerals shall comply with CBC 11B-703.2 & 11B-703.6. Vertical dimension of lowercase letters shall be proportional to height of uppercase letters.

2. Raised tactile characters shall be raised 1/32 inch minimum and shall be San Serif uppercase and lowercase characters and numerals accompanied by corresponding California Grade 2 Contract Braille. See Section 2.01.C below.
 3. Raised tactile characters shall have beveled edges.
 4. Characters shall have a minimum of 70 percent contrast with their backgrounds on all signs which identify, direct to, or give information about facilities and their use.
 5. Characters on all signs which identify, direct to, or give information about facilities and their use shall comply with CBC 11B-703.2.4 & 11B-703.2.6.
 6. Type styles of characters on all signs which identify, direct to, or give information about facilities and their use shall not be italic, oblique, or decorative in style.
 7. Non-tactile characters (letters, numbers and symbols) shall be as identified on the Drawings.
 - a. Characters shall be a combination of upper and lowercase font.
 - b. Upper case letters shall be 1 inch high (unless otherwise shown on Drawings, maximum 1 1/4 inch high).
 - c. Height of lowercase letters shall be proportional to height of upper case letter.
 8. Tactile Characters
 - a. Characters required to be tactile shall be San Serif.
 - b. Characters shall be raised 1/32 inch minimum and a maximum of 1/16 inch from the background.
 - c. Characters shall be uppercase unless otherwise shown on Drawings. Signs shall have tactile characters where shown on Drawings.
 - d. Upper case tactile letters shall be 1 inch high (unless otherwise shown on Drawings, maximum 1-1/4 inch high).
 - e. Height of lowercase letters shall be proportional to height of uppercase letter.
 - f. A minimum of 1/8" space between the top surfaces of adjacent characters measuring between the two closest points shall be provided.
 9. Non-Tactile Graphics and Text
 - a. Non-tactile graphics/pictogram and text shall be screen printed on the surface and complying section.
 - b. Identifying pictograms shall be located above the tactile text in a clear, six inch high field.
 - c. Non-tactile text shall be upper case and one inch high (unless otherwise shown on Drawings), and shall comply with CBC 11B-703.2.4, 11B-703.2.6, 11B-703.5.1, 11B-703.5.4, 11B-703.5.5, & 11B-703.6.2.
- C. Braille:
1. Braille text shall comply with CBC 11B-703.3.
 2. Braille on metal signs shall be embossed domed California Contracted Grade 2 Braille. All Braille shall be fabricated by a method which produces a rounded or domed dot shape. All Braille dots shall be solid or filled from behind so they cannot be crushed or indented.
 3. Braille dot, cell spacing and dot height shall follow specifications as per CBC11B-703.3 &

11B-703.3.1.

4. There shall be no Braille indication of capital letters except for proper names, individual letters or acronyms, or beginnings of sentences.
5. Braille shall be centered directly below raised print characters.
6. Braille shall be located on the sign 3/8 to 1/2 inch below the corresponding tactile characters, flush left or centered to the characters depending on the sign layout. (CBC 11B-703.2.9 & 11B-703.3.2).

- D. Polish sign panel edges to remove all fabrication burrs and sharp edges.
- E. See drawings for additional information.

2.03 SIGN TYPE SCHEDULE: (See Drawings for locations and additional design and mounting criteria not specified herein. Most signs are scheduled from the Opening Schedules on the Drawings. Additional signs are identified on site plans, floor plans and building elevations with keynotes. Actual colors and final text will be verified by the Architect during the submittal process.)

A. Type S-1, STANDARD INTERIOR & EXTERIOR ROOM IDENTIFICATION (Modular Acrylic/Framed):

1. Acrylic polymer sign panel fabricated per regulatory requirements identified in this section.
2. Where sign is mounted to glass, provide heavy-duty vinyl decal to back side of glass in same size as sign to obscure view of back of ID sign and adhesive. Decal shall have 1/4" rounded corners with color to be selected by Architect at time of submittal. Vinyl as custom fabricated by:

Signature Graphics
620 Sunbeam Ave.
Sacramento, CA 95811
Contact: Shane Duncan (916) 454-0800

~~B. Type S-2, STUDENT & STAFF RESTROOM DOOR AND SIDE WALL:~~

- ~~1. Acrylic polymer door and wall sign panels fabricated per regulatory requirements identified in this section.~~
- ~~2. Text and graphic symbols as specified herein and as indicated on the drawings.~~

~~C. Type S-3A, EXIT:~~

- ~~1. Acrylic polymer sign panel fabricated per regulatory requirements identified in this section. Text to read, "EXIT".~~

~~D. Type S-3B, NOT AN EXIT:~~

- ~~1. Acrylic polymer sign panel fabricated per regulatory requirements identified in this section. Text to read, "NOT AN EXIT".~~

E. Type S-3C, EXIT ROUTE:

1. Acrylic polymer sign panel fabricated per regulatory requirements identified in this section. Text

to read. "EXIT ROUTE".

F. ~~Type S-4, ASSISTIVE LISTENING DEVICE:~~

- ~~1. Acrylic polymer sign panel fabricated per regulatory requirements identified in this section.~~

G. ~~Type S-5, OCCUPANT LOAD:~~

- ~~1. Acrylic polymer sign panel fabricated per regulatory requirements identified in this section. See Drawings for individual occupant load information at each sign location.~~

H. ~~Type S-6, DOOR AND GLASS APPLIED DECAL LETTERS:~~

- ~~1. Vinyl transfer letters equal to those as custom fabricated by:~~

~~—— Signature Graphics
—— 620 Sunbeam Ave.
—— Sacramento, CA 95811
—— Contact: Shane Duncan (916) 454-0800~~

- ~~2. Provide single color heavy duty, self-adhesive, UV resistant, cut vinyl letters where indicated on the drawings.~~

- ~~3. Text to be 3 inches tall and shall read as follows:~~

- ~~a. FIRE RISER – Door mounted at all fire riser rooms and mounted on exterior of door.~~
- ~~b. OFFICE – Transom glass mounted. Mount on inside face of glass to be read from outside.~~
- ~~c. MULTI-PURPOSE ROOM – Transom glass mounted. Mount on inside face of glass to be read from outside.~~

- ~~4. Font to be Calibri Regular and color to be selected by architect at time of submittal.~~

I. ~~Type S-7, CAST ALUMINUM BUILDING LETTERS:~~

- ~~1. Individual raised letters shall be 4-inch to 12-inch tall x 3/4" minimum thick cast aluminum letters with powder coat finish. Font to be Calibri and color to be selected by Architect at time of submittal from manufacturer's full range of standard colors. Stand-off stud mounted with extensions as required to span through exterior insulation system. Install into solid backing. Text to read (upper and lower case):~~

- ~~a. **WELCOME** - Wall mounted text about reception desk – 8 inch tall.~~

- ~~2. Refer to Drawings for locations and sizes.~~

J. ~~Type S-8, CUT METAL PLATE BUILDING LETTERS:~~

- ~~1. Individual flat plate letters shall be 24 inch (or as otherwise indicated on the drawings) cast aluminum or min. 3/8" precision-cut aluminum or steel plate letters with powder coat finish.~~

Font to be Calibri and color to be selected by Architect at time of submittal from manufacturer's full range of standard colors. Stand-off stud mounted with screw attachment into metal panels with through bolt, washers and nut. Text to be ready (upper and lower case):

A. Oak Ridge Elementary School

K. Type S-9, Safe Dispersal Area:

1. Pole, building or gate mounted exterior sign made from .080 minimum aluminum sheet material and shall have minimum 0.125 inch rounded corner radius.
2. Size sign panel as required to accommodate 2 inch tall text to read "**AREA OF SAFE DISPERSAL**" but no smaller than 16" tall x 16" wide.
3. Sign panel shall have white painted background with black screen-printed text.
4. See site plan for locations.

L. Type S-10, SITE PARKING AND DIRECTIONAL SIGNS:

1. Signs include stop signs, accessible site entry sign, accessible and EVC stall signs and other site related parking, directional and regulatory signs. See drawings for additional information.
2. Unless otherwise indicated, signs shall be made from .080 minimum aluminum sheet material and shall have minimum 0.125 inch rounded corner radius and reflectorized finishes.
3. See drawings for pole and footing details.
4. See drawings for text, graphics and other design information.

M. Type S-11, CONCRETE CASTING LETTERS:

1. Provide ¼" thick disposable letters suitable for casting reliefs into finished concrete flatwork. Letters and shapes shall be as indicated on the drawings and made of a suitable material to withstand the concrete casting and finishing process then removed and discarded. Letters and shapes shall have a slightly tapered edge profile making them easy to remove and leaving a tapered reveal, reducing the sharp edge of a straight-sided letter. Letters can be of hardboard, rigid foam, plastic or other material. Provide items to Section 32 16 00, Site Concrete.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are complete and ready to receive Work.
- B. Beginning of installation means installer accepts existing surfaces.

3.01 INSTALLATION

- A. Signs shall be installed with edges horizontal and vertical and face plumb.
- B. Screw length shall be sufficient for minimum 1-inch embedment.

- C. Permanent identification signs for rooms or spaces shall be installed on the wall or glazed side-lite adjacent to the latch side of the door unless otherwise indicated on the drawings.
- D. Sign Mounting
 - 1. Mounting Height and Location:
 - a. Signs with raised characters and Braille shall be located 48 inches minimum to the baseline of the lowest line of Braille cells and 60 inches maximum to the baseline of the highest line of raised characters above the finish floor or ground surfaces. Mounting location shall be located so that a clear space of 18 inch minimum by minimum by 18 inch minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45-degree open position. CBC Section 11B-703.4.
 - b. Non-tactile/non-Braille signs shall be located as indicated on the drawings or as otherwise directed during installation.
 - 2. Framed & Unframed Plastic Signs:
 - a. Install with clear silicone adhesive, with zero clearance between plastic and face of substrate. Double face adhesive tape not permitted.
 - b. Additionally, Install with stainless steel countersunk flathead screws, pin torx, vandal-proof in each corner of sign or as otherwise shown on drawings for non-rectangular restroom signs. Pre-drill holes to prevent breaking plastic, use countersunk drill bits to flush screw head with sign surface.
 - 3. Metal Signs:
 - a. Install with four (4) flathead countersunk No. 8 stainless steel vandal-proof screws at pre-drilled holes, top of screw heads shall flush with sign surface, concealed mounting.
 - b. All metal site signs shall be mounted with bottom at 6'-8" above adjacent finish grade unless otherwise indicated on the drawings.
 - 4. Signs mounted onto glass:
 - a. Sign shall be securely attached to glass with full bed of clear silicone sealant. Wipe squeeze-out clean. Do not use double-stick tape.
 - b. Where interior and exterior signs are to be mounted back-to-back, signs shall be the same size (the larger sign size shall dictate the size of the smaller sign) and located back-to-back.
 - c. At locations where signs are applied to glass and without a corresponding sign on the back side, provide matte finished heavy-gauge vinyl decal on opposite side of glass from sign to conceal back of sign and adhesive anchors. Decal shall have ¼" rounded corners and be same size, shape and color of base sign.
- E. The Contractor is solely responsible for the identification of the material onto which signs are to be mounted. The Contractor shall furnish and install all materials necessary for the proper installation of each sign.

F. Clean and polish.

3.02 ADJUST AND CLEAN

- A. Clean and Touch-up: Remove all packing and protection blemishes and thoroughly clean and polish all finish surfaces. Restore any marred or abraded surfaces to their original condition by touching up in accordance with the manufacturer's recommendations. Touch-up shall not be obvious.
- B. Defective Work: Remove and replace all defective work which cannot be properly repaired, cleaned or touched-up with no additional cost to the owner.
- C. Protect installed work during the construction period to prevent abuse and damage.

3.03 CLEAN-UP

- A. Upon completion of the work of this section, remove all surplus materials, rubbish and debris from the premises.

3.04 FIELD QUALITY CONTROL

- A. DSA Inspections: Signs and identifications or other information shall be field inspected after installation and approved by Division of the State Architect prior to the issuance of a final certificate of occupancy, or final approval where no certificate of occupancy is issued. The inspection shall include, but not limited to, verification that Braille dots and cells are properly spaced and the size, proportion and type of raised characters are in compliance with CBC, Section 11B-703.1.1.2.

END OF SECTION

SECTION 10 26 00
WALL PROTECTION - CORNER GUARDS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Provide all vertical corner guards complete and in places as shown on the Drawings, specified here, and needed for a complete and proper installation.

1.02 RELATED SECTIONS

- A. The Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 09 29 00: Gypsum Board.

1.03 QUALITY ASSURANCE

- A. For installation of corner guards, use only personnel skilled in the work required, completely familiar with the manufacturer's recommended methods of installation, and thoroughly familiar with the requirements of this work.
- B. Catalog Standards:
 - 1. Manufacturer's catalog numbers may be shown on Drawings for convenience in identifying specified items. Unless modified by notation on Drawings or specified, catalog description for indicated number constitutes requirements for the item specified.
 - 2. The use of catalog numbers and specific requirements set forth in Drawings and Specifications does not preclude use of any other manufacturer's products or procedures which may be equivalent. Such numbers and requirements establish standards of design and quality for materials, construction, and workmanship.

1.04 SUBMITTALS

- A. Submit per the requirements of Division 0, General Conditions:
 - 1. Product Data.
 - 2. Installation instructions, locations and drawings.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver undamaged products to site in manufacturer's sealed containers or wrappings with legends intact. Store on site secure from weather, soil and physical damage.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Koroseal Wall Protection Systems, Muncy, PA. Ph: 800-628-0449; Fax: 330-668-7703; Internet Address: www.korogard.com.
- B. Kent Stainless: www.kentstainless.com.
- C. Approved equal.

2.02 MATERIALS

- A. **CG-1**: Corner Guard - Koroseal No. GS30 Series, or equal – Adhesive Applied.
 - 1. 3" x 3" x 60" high 90°
 - 2. Type 304 x 16 gauge thick No. 4 satin finish stainless steel.
 - 3. Corner radius 1/4 inch.
 - 4. Attachment: Adhesive as recommended by manufacturer.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

- A. Coordinate with all other trades as required to ensure proper and adequate provision in framing and wall finish for the installation of the corner guards in the locations required.

3.02 INSPECTION

- A. Prior to installation, carefully inspect and verify that the installed work of other trades is complete to the point where this installation may properly commence.
- B. Verify that products may be installed in strict accordance with the original design and the manufacturer's recommendations.
- C. In the event of discrepancy, immediately notify the Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.03 INSTALLATION

- A. Corner Guard **CG-1**:
 - 1. Shall be mounted at top of specified resilient base or cove base material.
 - 2. Do not overlap wall base.

3. Use liberal amount of construction adhesive per manufacturer's written instructions. Mask adjacent surfaces to avoid squeeze-out damage from excess adhesive.
4. Press corner guard into sealant to fully seat.
5. Remove any squeeze-out immediately for a clean installation.
6. Temporarily secure in place until adhesive is full cured.

3.04 CLEANING

- A. Upon completion, remove manufacturer's temporary labels, marks of identification. Thoroughly wash surfaces and remove foreign material. Leave entire work in neat, orderly, clean and acceptable condition as approved. Replace damaged parts and imperfect surfaces.

3.05 PROTECTION

- A. Protect work and materials of this Section prior to and during installation and protect the installed work and materials of other trades.
- B. Exposed finishes shall be free from scratches, dents, permanent discolorations and other defects in workmanship or material.
- C. In the event of damage, immediately make all repairs and replacements necessary to the satisfaction of the Architect and at no additional cost to the Owner.

END OF SECTION 10 26 00

SECTION 26 00 10
BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Table of Contents, Division 26 - Electrical:

<u>SECTION NO.</u>	<u>SECTION TITLE</u>
260010	BASIC ELECTRICAL REQUIREMENTS
260090	ELECTRICAL DEMOLITION
260519	BUILDING WIRE AND CABLE
260526	GROUNDING AND BONDING
260529	ELECTRICAL HANGERS AND SUPPORTS
260531	CONDUIT
260533	BOXES
260553	ELECTRICAL IDENTIFICATION
262416	PANELBOARDS
262719	SURFACE RACEWAYS
262726	WIRING DEVICES
262816	OVERCURRENT PROTECTIVE DEVICES
262819	DISCONNECT SWITCHES
265000	LIGHTING

B. Work included: This Section includes general administrative and procedural requirements for Division 26. The following administrative and procedural requirements are included in this Section to supplement the requirements specified in Division 01.

1. Quality assurance.
2. Definition of terms.
3. Submittals.
4. Coordination.
5. Record documents.
6. Operation and maintenance manuals.
7. Project management and coordination services.
8. Contract modification pricing procedures.
9. Excavation.
10. Rough-in.
11. Electrical installation.

12. Cutting, patching, painting, and sealing.
 13. Field quality control.
 14. Cleaning.
 15. Project closeout.
 16. Interface/Responsibility Matrix.
- C. Related Work: Consult all other Sections, determine the extent and character of related Work, and properly coordinate Work specified herein with that specified elsewhere to produce a complete and operable installation.
1. General and supplementary conditions: Drawings and general provisions of Contract and Division 01 of the Specifications, apply to all Division 26 Sections.
 2. Selective demolition: Nondestructive removal of materials and equipment for reuse or salvage as indicated. Also dismantling electrical materials and equipment made obsolete by these installations. Refer to Division 02, Selective Demolition.
 3. Miscellaneous metal work: Include fittings, brackets, backing, supports, rods, welding and pipe as required for support and bracing of raceways, luminaires, panelboards, distribution boards, switchboards, motor control centers, etc. Refer to Division 05, Miscellaneous Metals.
 4. Miscellaneous lumber and framing work: Include wood grounds, nailers, blocking, fasteners and anchorage for support of electrical materials and equipment. Refer to Division 06, Rough Carpentry.
 5. Moisture protection and smoke barrier penetrations: Include membrane clamps, sheet metal flashing, counter flashing, caulking and sealant as required for waterproofing of conduit penetrations and sealing penetrations in or through fire walls, floors, ceiling slabs and foundation walls. All penetrations through vapor barriers at slabs on grade shall be taped and made vapor tight. Refer to Division 07, Thermal and Moisture Protection.
 6. Access panels and doors: Required in walls, ceilings, and floors to provide access to electrical devices and equipment. Refer to Division 08, Access Doors also, Division 05, Metals.
 7. Painting: Include surface preparation, priming and finish coating as required for electrical cabinets, exposed conduit, pull and junction boxes, etc. where indicated as field painted in this Division. Refer to Division 09, Painting.
 8. Luminaire supports: Provide slack support wire for luminaires installed in acoustical tile or lay-in suspended ceilings. Refer to Division 09, Acoustical Treatment.
- D. Work furnished and installed under another Division requiring connections under this Division includes but is not limited to:

1. Electric motors.
2. Package mechanical equipment: fans, fan coil units, pumps, boilers, compressors, etc.
3. Pre-wired electrified partition furniture.
4. Electric signage.
5. Projection screens.

1.02 QUALITY ASSURANCE

- A. Reference to Codes, Standards, Specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Such codes or standards shall be considered a part of this Specification as though fully repeated herein.
- B. When codes, standards, regulations, etc. allow Work of lesser quality or extent than is specified under this Division, nothing in said codes shall be construed or inferred authority for reducing the quality, requirements, or extent of the Contract Documents. The Contract Documents address the minimum requirements for construction.
- C. Work shall be performed in accordance with all applicable requirements of the latest edition of all governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:

1. California Electric Code (CEC).
2. California Building Code (CBC).
3. California Fire Code (CFC).
4. California Mechanical Code (CMC).

- D. Standards: Equipment and materials specified under this Division shall conform to the following standards where applicable:

ACI	American Concrete Institute
ANSI	American National Standards Institute
ASTM	American Society for Testing Materials
CBM	Certified Ballast Manufacturers
ETL	Electrical Testing Laboratories
FS	Federal Specification
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IPCEA	Insulated Power Cable Engineer Association
NEMA	National Electrical Manufacturer's Association
UL	Underwriters' Laboratories

- E. Independent Testing Agency qualifications:

1. Testing Agency shall be an independent testing organization that will function as an unbiased authority, professionally independent of Manufacturer, Supplier and Contractor, furnishing and installing equipment or system evaluated by Testing Agency.
 2. Testing Agency shall be regularly engaged in the testing of electrical equipment, devices, installations, and systems.
 3. Testing Agency shall meet Federal Occupational Safety and Health Administration (OSHA) requirements for accreditation of independent testing laboratories, Title 9, Part 1907.
 4. On-site technical personnel shall be currently certified by the International Electrical Testing Association in electrical power distribution system testing.
 5. Testing Agency shall use technicians who are regularly employed by the firm for testing services.
 6. Contractor shall submit proof of above Testing Agency qualifications with bid documentation upon request.
- F. All base material shall be ASTM and/or ANSI standards.
- G. All electrical apparatus furnished under this Section shall conform to NEMA standards and the CEC and bear the UL label where such label is applicable.
- H. Certify that each welder performing Work has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone re-certification.

1.03 DEFINITION OF TERMS

- A. The following list of terms as used in the Division 26 documents shall be defined as follows:
1. "Provide": Shall mean furnish, install, and connect unless otherwise indicated.
 2. "Furnish": Shall mean purchase and deliver to Project site.
 3. "Install": Shall mean to physically install the items in-place.
 4. "Connect": Shall mean make final electrical connections for a complete operating piece of equipment.
 5. "As directed": Shall be as directed by the Owner or their authorized Representative.
 6. "Utility Companies": Shall mean the company providing electrical, telephone or cable television services to the Project.

1.04 SUBMITTALS

- A. Format: Furnish submittal data in electronic format for each Specification Section with a table of contents listing materials by Section and paragraph number.

- B. Submittals shall consist of detailed Shop Drawings, Specifications, block wiring diagrams, "catalog cuts" and data sheets containing physical and dimensional information, performance data, electrical characteristics, materials used in fabrication and material finish. Clearly indicate by arrows or brackets precisely what is being submitted on and those optional accessories which are included and those which are excluded. Furnish quantities of each submittal as noted in Division 01.
- C. Each submittal shall be labeled with the Specification Section Number and shall be accompanied by a cover letter or shall bear a stamp stating that the submittal has been thoroughly reviewed by the Contractor and is in full compliance with the requirements of the Contract Documents or provide a Specification Section line-by-line compliance response statement with detailed exception/ deviation response statements for all applicable provisions for the applicable Specification Section. Any Specification Section lines without a detailed exception/ deviation response statement shall be treated as the Contractor or Vendor is submitting in full compliance with the applicable Specification Section requirements. Cover letters shall list in full the items and data submitted. Failure to comply with this requirement shall constitute grounds for rejection of data.
- D. The Contractor shall submit detailed Drawings of all electrical equipment rooms and closets if the proposed installation layout differs from the construction documents. Physical size of electrical equipment indicated on the Drawings shall match those of the electrical equipment that is being submitted for review, i.e.: switchboards, panelboards, transformers, control panels, etc. Minimum scale: 1/4" = 1'- 0". Revised electrical equipment layouts must be approved prior to release of order for equipment and prior to installation.
- E. As part of the equipment and fixture submittals, the Contractor shall provide anchorage calculations for floor and wall mounted electrical equipment and fixtures, distribution conduits and raceways, in conformance with the 2019 California Building Code (CBC) and ASCE 7-16. Use the Occupancy Category, Ground Accelerations, Site Class, Seismic Design Category, and Seismic Importance Factor as noted in the structural drawings. For components required for Life Safety or containing hazardous materials use $I_p=1.5$. Structural Calculations shall be prepared, stamped, and signed by a California Registered Structural Engineer. Specify proof loads for drilled-in anchors, if used.
- F. The Manufacturer shall recommend the method of anchoring the equipment to the mounting surface and shall provide the Contractor with the assembly dimensions, weights, and approximate centers of gravity.
- G. Review of submittals is for general conformance to design concept and general compliance with the Specification Sections. Submittal Review Comments do not imply waiver of Specifications Section requirements unless specifically noted.
- H. All resubmittals shall include a cover letter that lists the action taken and revisions made to each Drawing and equipment data sheet in response to Submittal Review Comments. Resubmittal packages will not be reviewed unless accompanied by this cover letter. Failure to include this cover letter will constitute rejection of the resubmittal package.

- I. Shop Drawings for the following systems must be prepared via a computer aided drafting (CAD) building information modeling (Revit) system for submission by the Contractor. The Engineer can provide CADRevit files of the electrical Contract Documents to the Contractor.
 1. Manufactured wiring system, Section 260519.
 2. Fire alarm system, Section 266113.
 3. Security system, Section 266513.
 4. Telecommunication cabling system, Section 267113.

- J. Independent Testing Agency report:
 1. Testing Agency shall provide 3 copies of the complete testing report.
 2. Test report shall include the following:
 - a. Summary of Project.
 - b. Description of equipment.
 - c. Equipment used to conduct the test.
 - 1) Type.
 - 2) Manufacturer.
 - 3) Model number.
 - 4) Serial number.
 - 5) Date of last calibration.
 - 6) Documentation of calibration leading to NIST standards.
 - d. Description of test.
 - e. Test results, as compared to Manufacturers or industry accepted standards and tolerances.
 - f. Conclusion and recommendation.
 - g. Signature of responsible test organization authority.
 3. Furnish completed test report to Engineer no later than 30-days after completion of testing, unless otherwise directed.

- K. Substitutions:
 1. All requests for substitutions shall conform to the general requirements and procedure outlined in Division 01.

2. Where items are noted as "or equal," a product of equal design, construction and performance will be considered. Contractor must submit to the Engineer all pertinent test data, catalog cuts and product information required substantiating that the product is in fact equal to that specified. Only one substitution will be considered for each product specified.
3. Manufacturers' names and model numbers used in conjunction with materials, processes or equipment included in the Contract Documents are used to establish standards of quality, utility, and appearance. Materials, processes, or equipment, which in the opinion of the Engineer is equal in quality, utility, and appearance, will be approved as substitutions to that specified.
4. Whenever any material, process or equipment is specified in accordance with a Federal specification, an ASTM standard, an ANSI specification, UL rating or other association standard, the Contractor shall present an affidavit from the Manufacturer certifying that the product complies with the particular standard specification. When requested by the Engineer, support test data to substantiate compliance shall be submitted by the Contractor at no additional cost.
5. Substitutions shall be equal, in the opinion of the Architect/Engineer, to the specified product. The burden of proof of such shall rest with the Contractor. When the Architect/Engineer in writing accepts a substitution, it is with the understanding that the Contractor guaranteed the substituted article or material to be equal to the one specified and dimensioned to fit within the construction. Approved substitutions shall not relieve the Contractor of responsibilities for the proper execution of the Work or from any provisions of the Specifications.
6. The Contractor shall be responsible for all expenses in connection with the substitution materials, processes, and equipment, including the effect of the substitution on the Contractor, Subcontractor's, or other Contractor's Work. No substitution of material, processes or equipment shall be permitted without written authorization of the Architect/Engineer. Any assumptions on the acceptability of a proposed substitution prior to acceptance by the Engineer are at the sole risk of the Contractor.

1.05 COORDINATION

A. Discrepancies:

1. In the event of discrepancies within the Contract Documents, the Engineer shall be so notified, within sufficient time, as delineated in Division 01, prior to the Bid Opening to allow the issuance of an Addendum.
2. If, in the event that time does not permit notification or clarification of discrepancies prior to the Bid Opening, the following shall apply: The Drawings govern in matters of quantity and the Specifications govern in matters of quality. In the event of conflict within the Drawings involving quantities or within the Specifications involving quantities or within the Specifications involving quality, the greater quantity and higher quality

shall apply. Such discrepancies shall be noted and clarified in the Contractor's Bid. No additional allowances will be made because of errors, ambiguities or omissions that reasonably should have been discovered during the preparation of the Bid.

B. Project conditions:

1. Examination of Project site: The Contractor shall visit the Project site and thoroughly review the locale, working conditions, conflicting utilities, and the conditions in which the Electrical Work will take place. Verify all existing conditions in the field. No allowances will be made subsequently for any costs that may be incurred because of any error or omission due to failure to examine the Project site and to notify the Engineer of any discrepancies between Contract Documents and actual Project site conditions.
2. Protection: Keep conduits, junction boxes, outlet boxes and other openings closed to prevent entry of foreign matter. Cover fixtures, equipment, devices, and apparatus and protect them against dirt, paint, water, chemical or mechanical damage, before and during construction period. Prior to final acceptance, restore to original condition any fixture, apparatus or equipment damaged including restoration of damaged factory applied painted finishes. Protect bright finished surfaces and similar items until in service. No rust or damage will be permitted.
3. Supervision: Contractor shall personally or through an authorized and competent representative constantly supervise the Work from beginning to completion and, within reason, keep the same foreman and workmen on the Project throughout the Project duration.

C. Preparation:

1. Drawings:

- a. Layout: General layout indicated on the Drawings shall be followed except where other Work may conflict with the Drawings.
- b. Accuracy: Drawings for the Work under this Section are essentially diagrammatic within the constraints of the symbology applied.

1.06 RECORD DOCUMENTS

A. Provide Project Record Drawings as described herein:

1. Drawings shall fully represent installed conditions including actual locations of outlets, true panelboard connections following phase balancing routines, correct conduit, and wire sizing as well as routing, revised luminaire schedule listing Manufacturers and products installed and revised panel schedules. Contractor shall record all changes in the Work during the course of construction on blue or black line prints. These prints shall be made subject of monthly review by the Owner's Representative to ascertain that they are current. If not current, monthly payments may be withheld.

2. Record Drawings shall be the transfer of information on these prints to the construction documents via computer aided drafting (CAD)building information modeling (Revit) process. A set of Revit files of the electrical construction documents will be provided to the Contractor by the Engineer. For the BIM/clash detection process, a Revit file of the electrical construction documents will be provided to the Contractor by the Engineer, which will represent a LOD of 300 design level. The Contractor is responsible for updating the model with changes as well as taking the model to a LOD of 500 design level.
 3. Record drawing submissions shall be provided to the Engineer to review upon the completion of the following phases of Work:
 - a. All underground installation.
 - b. Building electrical rough-in.
 - c. Final electrical installation.
 4. Include in the record drawing submission the following shop drawing submission with all updated installation information:
 - a. Manufactured wiring system.
 5. A single set of half size prints of the Record Drawings shall be submitted for review. Upon receipt of the Engineer's review comments, corrections shall be made, and the Contractor shall provide the following:
 - a. Two sets of full-size prints.
 - b. Four sets of half-size prints.
 - c. One set of full size reproducibles.
 - d. Electronic files of Drawings in PDF and CADRevit.
- B. Panel schedules:
1. Typewritten panel schedules shall be provided for panelboards indicating the loads served and the correct branch circuit number. Schedules shall be prepared on forms provided by the Manufacturer and inserted in the pocket of the inner door of each panelboard. See Section 262416: Panelboards for requirements.
 2. A single set of the record panel schedules shall be submitted for review. Upon receipt of the Engineer's review comments, corrections shall be made, and the Contractor shall provide the following:
 - a. Fold and insert one copy of the appropriate schedule in the pocket of the inner door of each panelboard.
 - b. Three binders, each containing a full set of the panel schedules. Provide index listing all schedules and dividers for separation of schedules as follows:

1) 277/480V normal.

C. Field labels, markings, and warning signs: Provide in accordance and as required by:

1. General: CEC Article 110.21.
2. Arc-Flash Warning: CEC Article 110.16.
3. Identification of Disconnecting Means: CEC Article 110.22 (A).
4. Available Fault Current: CEC Article 110.24.
5. Depth of Working Space in Existing Buildings: CEC Article 110.26 (A)(1)(c).
6. Guarding of Live Parts: CEC Article 110.27 (C).
7. Locked Rooms or Enclosures: CEC Article 110.34 (C).

1.07 OPERATION AND MAINTENANCE MANUALS

A. Prior to Project closeout furnish to the Owner, six (6) hard back 3-ring binders containing all bulletins, operation and maintenance instructions, part lists, service telephone numbers and other pertinent information as noted in each Section all equipment furnished under Division 26. Binders shall be indexed into Division Sections and labeled for easy reference. Bulletins containing more information than the equipment concerned shall be properly stripped and assembled.

1.08 PROJECT MANAGEMENT AND COORDINATION SERVICES

- A. Overview: Contractor shall provide a Project Manager/Engineer for the duration of the Project to coordinate the Division 26 Work with all other trades. Coordination services, procedures and documentation responsibility shall include, but shall not be limited to the items listed in this Section.
- B. Review of Shop Drawings prepared by other Subcontractors:
1. Obtain copies of all Shop Drawings for equipment provided by others that require electrical service connections or interface with Division 26 Work.
 2. Perform a thorough review of the Shop Drawings to confirm compliance with the service requirements contained in the Division 26 Contract Documents. Document any discrepancy or deviation as follows:
 - a. Prepare memo summarizing the discrepancy.
 - b. Provide a copy of the specific shop drawing, indicating via cloud, the discrepancy.
 3. Prepare and maintain a shop drawing review log indicating the following information:
 - a. Shop drawing number and brief description of the system/material.
 - b. Date of your review.

- c. Indication if follow-up coordination is required.
- C. Request for information (RFI):
1. Thoroughly review the Contract Documents prior to the preparation and submission of an RFI. If an RFI is submitted, attach 8 1/2" x 11" copies of all relevant documents to clarify the issue.
 2. Prepare and maintain an RFI log indicating the following information:
 - a. RFI number and brief summary of the issue.
 - b. Date of issuance and receipt of response.
- D. Clarification confirmation memo (CCM):
1. Either the Contractor will prepare CCM memos or the Engineer to confirm a decision clarifying the Contract Documents that does not impact cost or affect other trades.
 2. Prepare and maintain a CCM log indicating the following information:
 - a. CCM number: Use CCM-C1, C2, etc. for memos issued by the Contractor and CCM-E1, E2, etc. for memos issued by the Engineer.
 - b. Brief summary of issue and date issued.
- 1.09 CONTRACT PRICING MODIFICATION PROCEDURES
- A. Submission guidelines: This Section covers the criteria for direct costs, mark-ups, and documentation requirements to be followed by the Contractor for any pricing modification to the Base Contract, where unit pricing has not already been established.
1. Change orders: Pricing for additions or deletions to the Base Contract Scope of Work upon acceptance of bid value and receipt of authorization to proceed.
 2. Allowances: Cost allowances may be assigned for specific Scope of Work outlined within the Base Contract where design has not been fully delineated on the Contract Documents. When detailed information is available, the Contractor shall prepare and submit a price quotation for the Work. This price quotation will be compared to the allowance value and any adjustments necessary to the Base Contract value shall be made via change order.
- B. Direct costs:
1. Labor:
 - a. Hourly labor rates shall not exceed the prevailing wage for the County where the Work is being performed. The costs for all supervision, including general superintendents and foremen, shall be included in the mark-up defined herein. Working foremen will be considered a direct cost only if the individual is on the Project site physically installing Work under the change order.

- b. Labor burden shall be based on rates currently in effect at the time the Work under the change order is being performed and shall include only fringe benefits by governing trade organizations, Federal Insurance Contribution Act, Federal and State Unemployment taxes, payroll taxes and net actual premium paid for public liability, workers' compensation, property damage and other forms of insurance required by the Owner. No other cost will be included as labor burden.
 - c. NECA Manual of Labor Units will be utilized as the basis for determining labor productivity rates for Electrical Work as follows:
 - 1) 85% of NECA column 1 (normal) for change in scope issued well in advance of Work needing to be performed, so as not to cause slow-down or Work stoppage.
 - 2) 100% of NECA column 1 (normal) for Work being performed with other Base Contract Work, not out of sequence and with minimal slow-down or Work stoppage.
 - 3) 100% of NECA column 2 (difficult) for Work performed out of sequence, requiring Work stoppage and reconstruction in areas already complete. This Work may involve the removal of ceiling tiles or the cutting and patching of walls.
 - d. No labor costs shall be included for the following items since the labor is already covered by the NECA labor units for conduit and construction channel:
 - 1) Conduit straps and clips.
 - 2) Construction channel accessories (nuts, washers, etc.).
 - 3) Screws.
 - 4) Conduit elbows $\frac{3}{4}$ " and smaller.
2. Material:
- a. The cost of material shall be the direct cost, including sales tax and may include the cost of transportation from the Supplier to the Contractor, but charges for final delivery to the Project site will not be allowed.
 - b. Electrical commodities priced based on most current Trade Service Book with a 15% discount. Non-commodities priced per invoice from Supplier.
3. Equipment rental:
- a. Payment for equipment costs will be made at the rental rates listed for such equipment as specified in the current edition, at the time of the Work, of "Labor Surcharge and Equipment Rental Rates," a Caltrans Publication. Such rental rates shall be adjusted as appropriate and will be used to compute payments for equipment; regardless of the whether the equipment is under Contractor's control

through direct ownership, leasing, renting or other method of acquisition. Daily, weekly, or monthly rates shall be used, whichever is lower. Hourly rates including operator shall not be used.

- b. The actual time to be paid for equipment shall be the time the equipment is in productive operation on the Work. No payment will be made time while equipment is inoperative due to breakdown or for non-working days.
 - c. Individual pieces of equipment having a replacement value of \$1,000 or less shall be considered small tools or small equipment and no payment will be made since the costs of these tools and equipment are included as part of the Contractor's mark-up for overhead and profit.
 - d. Payment to Contractor for use of equipment as set forth herein shall constitute full compensation to Contractor for the cost of fuel, power, oil, lubricants, supplies, small equipment, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, labor (except for equipment operators) and any and all costs to Contractor for incidental use of the equipment.
4. Performance bond: Only the actual cost of insurance and bond premiums, with no mark-up for overhead and profit, will be allowed.
- C. Mark-up for overhead and profit on direct costs:
1. Costs to be included as part of mark-up:
 - a. Field and home office personnel including, but not limited to, Principals, Project Managers, Superintendents, Supervisory Foremen, Estimators, Project Engineers, Detailers, Draftspersons, Schedulers and Administrative Assistants.
 - b. All field and home office expenses including, but not limited to, field trailers, parking, storage sheds, office equipment and supplies, telephone service at the Project site, long-distance telephone calls, fax machines, computers and software, temporary utilities, sanitary facilities, etc.
 - c. Administrative functions including, but not limited to, reviewing, coordinating, distributing, processing, posting, recording, estimating, negotiating, scheduling, schedule updating and revising, expediting, detailing, revising Shop Drawings and preparing Record Drawings.
 - d. Vehicles required for the transportation of Contractor's staff and field personnel.
 2. Maximum mark-up values:
 - a. For Work performed by the Contractor, the overhead mark-up shall equal a maximum of 10 percent of the direct costs, as defined herein.
 - b. Mark-up for profit shall equal a maximum of 5 percent of combined direct and overhead costs.

- c. For Work performed by a Subcontractor shall equal a maximum of 5 percent mark-up for profit. Subcontractor shall follow the same guidelines above for their mark-up allowance. No consideration shall be given for more mark-ups than this two-tier arrangement whereas the mark-up could exceed 20%.
 - d. For Work scope changes that result in a net decrease in cost to the Contractor or a Subcontractor, the Owner shall receive a credit based on the actual net decrease in direct cost figured in the same manner as an add cost. It is understood that the mark-up value applied at bid time will not be credited back. Although, if this is a change to a previous change order, then mark-up values shall be included in credit back to Owner.
 - e. There will be no mark-ups on the cost of performance bond.
- D. Documentation:
- 1. Project change order request submission:
 - a. Provide copies of all take-off sheets showing material and labor charges in line item format.
 - b. Provide recap sheet showing all direct costs and mark-ups.
 - c. Provide copies of invoices for Subcontracted Work.
 - 2. Allowance account tracking:
 - a. Contractor shall prepare and maintain a spreadsheet for each allowance account to track and monitor the requested and approved charges.
 - b. Copies of these spreadsheets, along with the summary spreadsheets, shall be submitted to the Owner's Representative twice a month.

PART 2 - PRODUCTS (NOT APPLICABLE)**PART 3 - EXECUTION****3.01 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION**

- A. All work shall be installed in a neat, workmanlike manner in accordance with ANSI/NECA 1-2015.
- B. Comply with the requirements of all listed codes and standards.
- C. All materials and equipment provided under this contract shall be new (except where otherwise noted) and shall be listed, labeled or certified by a Nationally Recognized Testing Laboratory (NRTL) to meet Underwriters Laboratories, Inc. (UL), standards where test standards have been established. Materials and equipment which are not covered by UL standards will be accepted, providing that materials and equipment are listed, labeled, certified or otherwise determined to meet the safety requirements of a NRTL.

- D. All equipment of the same type and capacity shall be by the same manufacturer.
- E. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.
- F. During construction the contractor shall at all times maintain electrical utilities of the building without interruption. Should it be necessary to interrupt any electrical service or utility, the contractor shall secure permission in writing from the owner's representative for such Interruption at least ten (10) business days in advance. Any interruption shall be made with minimum amount of inconvenience and any shut-down time shall have to be on a premium time basis and such time to be included in the contractor's bid. Arrange to provide and pay for temporary power source as required by project conditions.
- G. Working clearance around equipment shall not be less than that specified in the CEC for all voltages specified.
- H. The locations of switches, receptacles, lights, motors, etc. outlets shown are approximate. The contractor shall use good judgment in placing the preceding items to eliminate all interference with ducts, piping, etc. The contractor shall check all door swings so that light switches are not located behind doors. Relocate switches as required, with approval from the Design Professional. The owner's representative may direct relocation of outlets before installation, up to five (5) feet from the position indicated on the Drawings, without additional cost.
- I. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity. Normal maintenance shall not require the removal of protective guards from adjacent equipment. Install equipment as close as practical to the locations shown on the Drawings.
 - 1. Where the owner's representative determines that the Contractor has installed equipment not conveniently accessible for operations and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the owner.
 - 2. "Conveniently Accessible" is defined as being capable of being reached without climbing or crawling over or under obstacles such as motors, pumps, belt guards, transformers, racks, piping, ductwork, raceways or similar.
- J. Owner furnished equipment: Equipment furnished by the District shall be received, stored, uncrated, protected, and installed by the Contractor with all appurtenances required to place the equipment in operation, ready for use. The Contractor shall be responsible for the equipment as if he had purchased the equipment himself and shall hold the warranty

3.02 ROUGH-IN

- A. Contractor shall verify lines, levels and dimensions indicated on the Drawings and shall be responsible for the accuracy of the setting out of Work and for its strict conformance with existing conditions at the Project site.
- B. Verify final locations for rough ins with field measurements and with the requirements for the actual equipment to be connected.
- C. Refer to equipment specification in Divisions 22 through 33 for rough-in requirements.

3.03 ELECTRICAL INSTALLATION

- A. Preparation, sequencing, handling, and installation shall be in accordance with Manufacturer's written instructions and technical data particular to the product specified and/or accepted equal except as otherwise specified. Comply with the following requirements:
 - 1. Shop Drawings prepared by Manufacturer.
 - 2. Verify all dimensions by field measurements.
 - 3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.
 - 4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
 - 5. Sequence, coordinate and integrate installations of electrical materials and equipment for efficient flow of the Work. Give attention to large equipment requiring positioning prior to closing in the building.
 - 6. Where mounting height is not detailed or dimensioned, contact the Architect for direction prior to proceeding with rough-in.
 - 7. Install systems, materials, and equipment to conform with approved submittal data, including coordination Drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are indicated only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.
 - 8. Install systems, materials, and equipment level and plumb, parallel, and perpendicular to other building systems and components, where installed exposed in finished spaces.
 - 9. Install electrical equipment to facilitate servicing, maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
 - 10. Coordinate electrical systems, equipment, and materials installations with other building components.

11. Provide access panel or doors where devices or equipment are concealed behind finished surfaces. Furnish and install access doors per the requirements of Division 08.
12. Install systems, materials and equipment giving right-of-way priority to other systems that are required to maintain a specified slope.
13. Conform to the National Electrical Contractors Association "Standard of Installation" for general installation practice.

3.04 CUTTING, PATCHING, PAINTING AND SEALING

- A. Structural members shall in no case be drilled, bored, or notched in such a manner that will impair their structural value. Cutting of holes, if required, shall be done with core drill and only with the approval of the Architect and Structural Engineer.
- B. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
- C. Cut, remove, and legally dispose of selected electrical equipment, components and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new work.
- D. Protect the structure, furnishings, finishes and adjacent materials not indicated or scheduled to be removed.
- E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
- F. Patch existing surfaces and building components using experienced installers and new materials matching existing materials and the original installation. For installers' qualifications refer to the materials and methods required for the surface and building components being patched.
- G. Application of joint sealers:
 1. General: Comply with joint sealer Manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.
 2. Installation of fire-stopping sealant: Install sealant, including forming, packing and other accessory materials, to fill openings around electrical services penetrating floors and walls, to provide fire-stops and fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

3.05 FIELD QUALITY CONTROL

- A. General testing requirements:

1. The purpose of testing is to ensure that all tested electrical equipment, both Contractor and Owner supplied, is operational and within industry and Manufacturer's tolerances and is installed in accordance with design Specifications.
 2. Tests and inspections shall determine suitability for energization.
 3. Perform tests in presence of the Owner's Representative and furnish test equipment, facilities and technical personnel required to perform tests.
 4. Tests shall be conducted during the construction period and at completion to determine conformity with applicable codes and with these Specifications.
- B. Tests: In addition to specific system test described elsewhere, tests shall include:
1. Equipment operations: Test motors for correct operation and rotation.
 2. Lighting control circuits: Test lighting circuits for correct operation through their control devices.
 3. Circuit numbering verification: Select on a random basis, various circuit breakers within the panelboards and cycle them on and off to verify compliance of the typed panel directories with actual field wiring.
 4. Voltage check:
 - a. At completion of job, check voltage at several points of utilization on the system that has been installed under this Contract. During test, energize all installed loads.
 - b. Adjust taps on transformers to give proper voltage, which is 118 to 122volts for 120volt nominal systems and proportionately equivalent for higher voltage systems. If proper voltage cannot be obtained, inform the Owner and the serving Utility Company.
- C. Contractor shall provide test power required when testing equipment before service energization and coordinate availability of test power with General Contractor after service energization. The Contractor shall provide any specialized test power as needed or specified herein.
- D. Testing safety and precautions:
1. Safety practices shall include the following requirements:
 - a. Applicable State and Local safety operating procedures.
 - b. OSHA.
 - c. NSC.
 - d. NFPA 70E.
 2. All tests shall be performed with apparatus de-energized and grounded except where otherwise specifically required ungrounded by test procedure.

- E. Calibration of test equipment:
 - 1. Testing Agency shall have calibration program that assures test instruments are maintained within rated accuracy.
 - 2. Instruments shall be calibrated in accordance with the following frequency schedule:
 - a. Field instruments: Analog, 6-months maximum; Digital, 12-months maximum.
 - b. Laboratory instruments: 12-months.
 - c. Leased specialty equipment: 12-months where accuracy is guaranteed by lessor.
 - 3. Dated calibration labels shall be visible on test equipment.
 - 4. Records, which show date and results of instruments calibrated or tested, must be kept up to date.
 - 5. Up-to-date instrument calibration instructions and procedures shall be maintained for test instrument.
 - 6. Calibration standards shall be of higher accuracy than instrument tested.
 - 7. Equipment used for field testing shall be more accurate than instrument being tested.
- F. Coordinate with General Contractor regarding testing schedule and availability of equipment ready for testing.
- G. Notify Owner and Engineer one week in advance of any testing.
- H. Any products which fail during the tests or are ruled unsatisfactory by the Owner's Representative shall be replaced, repaired, or corrected as prescribed by the Owner's Representative at the expense of the Contractor. Tests shall be performed after repairs, replacements or corrections until satisfactory performance is demonstrated.
- I. Testing Agency shall maintain written record of tests and shall assemble and certify final test report.
- J. Include all test results in the maintenance manuals.

3.06 CLEANING

- A. Prior to energizing of electrical equipment, the Contractor shall thoroughly clean the interior of enclosures from construction debris, scrap wire, etc. using Manufacturer's approved methods and materials.
- B. Upon completion of Project, prior to final acceptance, the Contractor shall thoroughly clean both the interior and exterior of all electrical equipment per Manufacturers approved methods and materials. Remove paint splatters and other spots, dirt, and debris.
- C. Touch-up paint any marks, blemishes or other finish damage suffered during installation.

3.07 PROJECT CLOSEOUT

- A. Training:
1. At the time of completion, a period of not less than 4-hours shall be allotted by the Contractor for instruction of building operating and maintenance personnel in the use of all systems. This 4-hour training is in addition to any instruction time called out in the Specifications for specific systems. All personnel shall be instructed at one time, the Contractor making all necessary arrangements with Manufacturer's Representative. The equipment Manufacturer shall be requested to provide product literature and application guides for the users' reference. Costs, if any, for the above services shall be paid by the Contractor.
 2. All training sessions shall be video recorded. Confirm file type, i.e. MOV, AVI, MP4, etc. with the district. Each specification section that requires training shall include one file, and all Division 26 specifications shall be stored on a flash drive (USB3.0, 1TB min.) 3 flash drives shall be provided to the district representative with closeout documentation.
- B. Special tools: Provide one of each tool type required for proper operation and maintenance of the equipment provided under this Section. All tools shall be delivered to the Owner at the Project completion.
- C. Keying: Provide two keys for each lock furnished under this Section and turn over to Owner.

END OF SECTION 26 00 10

**SECTION 26 00 90
ELECTRICAL DEMOLITION**

PART 1 - GENERAL

1.01 SUMMARY

A. Work included: Labor and equipment necessary to complete the demolition required for the item specified under this Division, including but not limited to:

1. Electrical demolition

1.02 SYSTEM DESCRIPTION

- A. Disconnection, removal and relocation of all wiring, luminaires, outlets, conduit, and all other types of electrical equipment as described on Drawings.
- B. Purpose is to remove, relocate and extend existing installations to accommodate new construction.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment necessary for patching and extending Work, as specified in other Sections.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall thoroughly review conditions in the area of demolition prior to commencing Work to ensure complete understanding of existing installation in relationship to demolition Work.

3.02 GENERAL REQUIREMENTS

- A. Remove all wiring, luminaires, outlets, conduit, and all other types of electrical equipment indicated to be removed. Devices that are to be removed may require reworking conduit and wiring in order to maintain service to other devices. If removed devices are on walls or ceilings that are to remain, blank coverplates are to be installed on outlet boxes.
- B. Where remodeling interferes with circuits in areas that are otherwise undisturbed, circuits shall be reworked as required.
- C. Existing devices and circuiting that are indicated are indicated only for informational purposes. Contractor shall visit the Project site and shall verify conditions as they exist and shall remove, relocate, and/or rework any electrical equipment or circuits affected (whether indicated or not) due to removal of existing walls, ceilings, etc. Coordinate all Work with that of other trades.

- D. All equipment, luminaires, devices, etc., which are removed shall be delivered to the Owner for disposition. All items which are removed and not wanted by the Owner and which are not reused shall become the property of the Contractor and shall be legally removed from the Project site.
- E. Cutting and patching necessary for the removal of Electrical Work shall be included.
- F. Remove and replace luminaires, rework, relocate or replace conduit and wiring and do other Work required by the installation of new ductwork, piping, etc., above the ceiling. Coordinate with other trades and verify the extent of the Work.

3.03 LUMINAIRES

- A. Disconnect and remove abandoned luminaires. Remove conduits, wiring, boxes, brackets, stems, hangers, and other accessories.

3.04 OUTLETS

- A. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

3.05 CONDUIT

- A. Remove abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors and patch surfaces.

3.06 WIRING

- A. Remove abandoned wiring to source of supply.

3.07 EXISTING SYSTEMS

- A. Electrical distribution system: Disable system only to make switchovers and connections. Obtain permission from Owner's designated representative at least 24-hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to Work area.

3.08 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment that shall remain.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.
- C. Luminaries: Remove lenses and lamps and clean all exposed surfaces. Also clean the lenses or replace if discolored. Provide all new lamping when re-assembling.

END OF SECTION 26 00 90

**SECTION 26 05 19
BUILDING WIRE AND CABLE**

PART 1 - GENERAL

1.01 SUMMARY

- A. Work included: Labor, materials, and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:
 - 1. Building wire.
 - 2. Cable.
 - 3. Wiring connections and terminations.
- B. Related Work: Consult all other Sections, determine the extent and character of related Work, and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1.02 REFERENCES

- A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:
 - 1. Underwriters Laboratories, Inc. (UL):
 - UL 4; Armored Cable.
 - UL 44; Thermoset-Insulated Wires and Cables.
 - UL 62; Flexible Cord and Fixture Wire.
 - UL 83; Thermoplastic-Insulated Wires and Cables.
 - UL 183; Manufactured Wiring Systems.
 - UL 310; Electrical Quick-Connect Terminals.
 - UL 486A & B; Wire Connectors.
 - UL 486C; Splicing Wire Connectors.
 - UL 486D; Insulated Wire Connector Systems for Underground Use or in Damp or Wet Locations.
 - UL 493; Thermoplastic-Insulated Underground Feeder and Branch Circuit Cables.
 - UL 510; Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape.
 - UL 854; Service-Entrance Cables.
 - UL 1569; Metal-Clad Cables.

- UL 1581; Reference Standard for Electrical Wires, Cables and Flexible Cords.
- UL 2196; Standard for Tests of Fire Resistive Cables.
- 2. National Electrical Manufacturer Association (NEMA):
 - NEMA WC-70; Power Cables Rated 2,000 V or Less for the Distribution of Electrical Energy.
- 3. Institute of Electrical and Electronic Engineers (IEEE):
 - IEEE 82; Test Procedure for Impulse Voltage Tests on Insulated Conductors.
 - IEEE 576; Recommended Practice for Installation, Termination, and Testing of Insulated Power Cable as Used in Industrial and Commercial Applications.

1.03 SUBMITTALS

- A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:
 - 1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
 - 2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
 - 3. Submit Manufacturer's installation instructions.
 - 4. Final test results.

1.04 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new, unused, and currently under production.
- B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.
- C. Independent Testing Agency qualifications: Refer to Section 260010: Basic Electrical Requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.
 - 1. Building wire:

- a. Cerrowire
 - b. General Cable
 - c. Southwire Company
 - d. Stabiloy (aluminum only)
 - e. United Wire and Cable
2. Flexible cords and cables:
- a. Carol Cable Company
 - b. Cerrowire
 - c. PWC Corp
3. Wiring connectors and terminations:
- a. 3M Company.
 - b. Ideal.
 - c. Blackburn-Holub.
 - d. Burndy.
 - e. Thomas & Betts Corp.
 - f. Beau Barrier.
- B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.02 BUILDING WIRE

- A. Conductor material:
1. Provide annealed copper for all wire, conductor, and cable, unless otherwise indicated.
 2. All building wire shall be stranded, unless otherwise indicated.
- B. Insulation material:
1. All insulated wire, conductor and cable shall be 600volt rated, unless otherwise noted on the Drawings.
 2. Thermoplastic-insulated building wire.
 3. Rubber-insulated building wire.
 4. Copper feeders and branch circuits larger than #6 AWG: Type THW, XHHW or dual rated THHN/THWN.

5. Copper feeders and branch circuits #6 AWG and smaller: Type TW, THW, XHHW or dual rated THHN/THWN.
6. Feeders and branch circuits for direct-current (DC) in wet locations: Type XHHW-2.
7. Conductors for variable frequency drives (VFD): Type XHHW-2.
8. Service Entrance: Type RHW or THWN.
9. Control Circuits: Type THW or dual rated THHN/THWN.
10. Identify system conductors as to voltage and phase connections by means of color-impregnated insulation.

2.03 FLEXIBLE CORDS AND CABLES (TYPE'S')

- A. Provide flexible cords and cables of size, type and arrangement as indicated on the Drawings.
- B. Type 'S' flexible cords and cables shall be manufactured in accordance with CEC Article 400 and composed of two or more conductors and a full size green insulated ground wire with an outer jacket of rubber or neoprene as noted.
- C. Flexible cords and cables shall be fitted with wire mesh strain relief grips either as an integral component of the connector or as an independently supported unit.
- D. Suspended flexible cords and cables shall incorporate safety spring(s) unless otherwise noted.

2.04 WIRING CONNECTIONS AND TERMINATIONS

- A. Bolted pressure connectors: Provide wide range-taking connectors with cast bronze compression bolts, designed for parallel taps, tees, crosses or end-to-end connections.
- B. Electrical spring wire connectors:
 1. Provide multi-part construction incorporating a non-restricted, zinc coated square cross-section steel spring enclosed in a steel sheet with an outer jacket of plastic and insulating skirt.
 2. Self-striping pigtail and tap U-contact connectors shall not be used.
- C. Compression type terminating lugs:
 1. Provide tin-plated copper high-compression type lugs for installation with hand or hydraulically operated circumference-crimping tools and dies as stipulated by the lug Manufacturer or as indicated on Drawings. Notch or single point type crimping is NOT acceptable.
 2. Two-hole, long barrel lugs shall be provided for size #4/0 and larger wire where terminated to bus bars. Use minimum of three crimps per lug, on sizes where possible.

- D. Splicing and insulating tape: Provide black, ultraviolet proof, self-extinguishing, 7-mil thick vinyl general purpose electrical tape with a dielectric strength of 10,000volts suitable for temperatures from minus 18-degrees C to 105-degrees C.
- E. Insulating putty:
 - 1. Provide pads or rolls of non-corrosive, self-fusing, one-eighth inch thick rubber putty with PVC backing sheet. Scotch vinyl mastic pads and roll or equal.
 - 2. Use putty suitable for temperatures from minus 17.8-degrees C to 37.8-degrees C with a dielectric strength of 570volts/mil minimum.
- F. Insulating resin:
 - 1. Provide two-part liquid epoxy resin with resin and catalyst in pre-measured, sealed mixing pouch. Scotchcast 4 or equal for wet or underground vaults, boxes, etc. splices or terminations.
 - 2. Use resin with a set up time of approximately 30-minutes at 21.1-degrees C and with thermal and dielectric properties equal to the insulating properties of the cables immersed in the resin.
- G. Terminal strips:
 - 1. Provide box type terminal strips in the required quantity plus 25% spare. Install in continuous rows in terminal cabinets.
 - 2. Use the box type terminal strips with barrier open backs and with ampere ratings as required.
 - 3. Identify all terminals with numbering sequence being used for a system.
- H. Cable ties: Provide harnessing and point-to-point wire bundling with nylon cable ties. All cable ties shall be installed using tool supplied by Manufacturer of ties.
- I. Wire lubricating compound:
 - 1. UL listed for the wire insulation and conduit type and shall not harden or become adhesive.
 - 2. Shall not be used on wire for isolated type electrical power systems.
- J. Bolt termination hardware:
 - 1. Bolts shall be plated, medium carbon steel heat-treated, quenched and tempered equal to ASTM A-325 or SAE grade 5; or silicon bronze alloy ASTM B-9954 Type B.
 - 2. Nuts shall be heavy semi-finished hexagon, conforming to ANSI B18.2.2, threads to be unified coarse series (UNC), class 2B steel or silicon bronze alloy.
 - 3. Flat washers shall be steel or silicon bronze, Type A plain standard wide series, confirming to ANSI B27.2. SAE or narrow series shall not be used.

4. Belleville conical spring washers shall be hardened steel, cadmium plated or silicon bronze.
5. Each bolt connecting lug(s) to a terminal or bus shall not carry current exceeding the following values:
 - a. 1/4" bolt: 125amps
 - b. 5/16" bolt: 175amps
 - c. 3/8" bolt: 225amps
 - d. 1/2" bolt: 300amps
 - e. 5/8" bolt: 375amps
 - f. 3/4" bolt: 450amps

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall thoroughly examine Project site conditions for acceptance of wire and cable installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.02 APPLICATION

- A. All wire, conductor and cable with their respective connectors, fittings and supports shall be UL listed for the installed application and ambient condition.
- B. Feeders and branch circuits in wet locations shall be rated 75-degree C.
- C. Feeders and branch circuits in dry locations shall be rated 90-degree C.
- D. Feeders and branch circuits for direct-current (DC) systems, such as PV installations, in wet locations shall be type XHHW-2 copper conductors.
- E. For wiring of the following, refer to the indicated Code Articles:
 1. Fire pump systems shall comply with CEC Article 695.
 2. Emergency systems shall comply with CEC Article 700.
 3. Fire alarm systems shall comply with CEC Article 760.
 4. Where the any above are required to be fire-resistive, refer to CEC Article 728.
- F. Minimum conductor size:
 1. Provide minimum AWG #12 for all power and lighting branch circuits.
 2. Provide minimum AWG #14 for all line voltage signal and control wiring unless otherwise indicated.

- G. Color coding:
1. For 120/208volt, 3-phase, 4-wire systems:
 - a. Phase A - Black
 - b. Phase B - Red
 - c. Phase C - Blue
 - d. Neutral - White
 - e. Ground - Green
 2. For 277/480volt, 3-phase, 4-wire systems:
 - a. Phase A - Brown
 - b. Phase B - Orange
 - c. Phase C - Yellow
 - d. Neutral - Gray
 - e. Ground - Green
 3. Switch leg individually installed shall be the same color as the branch circuit to which they are connected, unless otherwise noted.
 4. Travelers for 3-way and 4-way switches shall be a distinct color and pulled with the circuit switch leg or neutral.

3.03 WIRING METHODS

- A. Install wires and cables in accordance with Manufacturer's written instructions, as indicated on Drawings and as specified herein.
- B. Install all single conductors in raceway system, unless otherwise noted.
- C. Parallel circuit conductors and terminations shall be equal in length and identical in all ways.
- D. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than #10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.
- E. 20amp power and lighting branch circuit containing no more than four (4) current carrying conductors (phases and neutrals). Use #10 AWG conductor for 120/208volt circuits located outside a 75-foot radius of panel source and for 277/480volt branch circuits located outside a 200-foot radius of panel source, unless otherwise noted.
- F. 20amp power and lighting branch circuits containing no more than eight (8) current carrying conductors (phases and neutrals). Use #10 AWG conductors for 120/208volt circuits located

- outside a 65-foot radius of panel source and for 277/480volt circuits located outside a 150-foot radius of panel source.
- G. Provide #10 AWG pig tails on all 20amp and 30amp wiring devices served by #8 AWG conductors and larger.
 - H. Splice cables and wires only in outlet boxes, junction boxes, pull boxes, manholes or handholes. Group and bundle with tie wrap each neutral with its associated phase conductor where more than one neutral is present in a conduit.
 - I. Install cable supports for all vertical feeders in accordance with the CEC Article 300. Provide split wedge type fittings, which firmly clamp each individual cable and tighten due to cable weight.
 - J. Neatly form, train, and tie the cables in individual circuits. For panelboards, cabinets, wireways, switches, and equipment assemblies.
 - K. Seal cable or wire, entering a building from underground or exiting walk-in cold box or freezer, between the wire or cable and conduit, where it exits the conduit, with a non-hardening approved compound, i.e. duct seal or equal.
 - L. Provide UL-listed factory-fabricated, solderless metal connectors of size, ampacity rating, material, type, and class for applications and for services indicated. Use connectors with temperature ratings equal to or greater than the wires that are being terminated.
 - M. Stranded wire shall be terminated using fitting, lugs or devices listed for the application. However, in no case shall stranded wire be terminated solely by wrapping it around a screw or bolt.
 - N. Flexible cords and cables supplied, as part of a pre-manufacturer fixture or unit assembly shall be installed according to Manufacturers published installation instructions.

3.04 WIRING INSTALLATION IN RACEWAYS

- A. Install wire in raceway in accordance with IEEE 576, Manufacturer's written instructions, as indicated on the Drawings and as specified herein after interior of building has been physically protected from the weather and all mechanical Work likely to injure conductors has been completed. Pull all conductors into a raceway at the same time. Exercise care in pulling conductors so that insulation is not damaged. Use UL listed, non-petroleum base and insulating type pulling compound as needed.
- B. Completely mandrel all underground or concrete encased conduits prior to installing conductors.
- C. Completely and thoroughly swab raceway system before installing conductors.
- D. Do not use block and tackle, power driven winch or other mechanical means for pulling conductors of size smaller than #1 AWG.
- E. Wire pulling:

1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling of cables.
 2. Use rope made of nonmetallic material for pulling feeders.
 3. Attach pulling lines for feeders by means of either woven basket grips or pulling eyes attached directly to the conductors.
 4. Pull in together multiple conductors or cables in a single conduit.
 5. Pulling tensions and sidewall pressures shall not exceed 60% of the manufacturer's recommended maximum values. Pulling tension shall be continuously monitored during the pull by a calibrated dynamometer. If pulling tension is exceeded during the pull, immediately notify the engineer to determine if the cables will be considered damaged and require contractor replacement.
- F. Install and test all cables in accordance with Manufacturer's instructions and warranty.

3.05 WIRE SPLICES, JOINTS AND TERMINATION

- A. Join and terminate wire, conductors, and cables in accordance with UL 486A, C, CEC and Manufacturer's instructions.
- B. Thoroughly clean wires before installing lugs and connectors.
- C. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.
- D. Splices and terminations shall be made mechanically and electrically secure.
- E. Where it's determined that unsatisfactory splice or terminations have been installed, remove the devices and install approved devices at no addition cost.
- F. Terminate wires in Terminal Cabinets, relay, and contactor panels, etc. using terminal strip connectors.
- G. Insulate spare conductors with electrical tape and leave sufficient length to terminate anywhere in the panel or cabinet.
- H. Install cable ties and maintain harnessing.
- I. Encapsulate splices in exterior outlets, pull boxes and junction boxes using specified insulating resin kits. Make all splices watertight for exterior equipment and equipment in pump rooms.
- J. Make up all splices and taps in accessible junction or outlet boxes with connectors as specified herein. Pigtails and taps shall be the same color as the feed conductor. Form conductor prior to cutting and provide at least 6-inches of tail and neatly packed in box after splice is made up.
- K. Branch circuits (#10 AWG and smaller):

1. Connectors: Solderless, screw-on, reusable spring pressure cable type, 600volt, 105-degree C. with integral insulation, approved for copper conductors.
 2. The integral insulator shall have a skirt to completely cover the stripped wires.
 3. The number, size and combination of conductors as listed on the Manufacturers packaging shall be strictly complied with.
- L. Feeder circuits: (#6 to 750 kCMIL)
1. Join or tap conductors from #6 AWG to 750 kCMIL using bolted pressure connectors or insulate mechanical compression (hi-press) taps with pre-molded, snap-on insulating boots or specified conformable insulating pad and over wrapped with two half-lapped layers of vinyl insulating tape starting and ending at the middle of the joint.
 2. Terminate conductors from size #6 AWG to 750 kCMIL copper using bolted pressure or mechanical compression lugs in accordance with Manufacturer recommendation or as specified elsewhere.
 3. Field installed compression connectors for cable sizes 250 kCMIL and larger shall have not less than two clamping elements or compression indents per wire.
 4. Insulate splices and joints with materials approved for the particular use, location, voltage, and temperature. Insulate with not less than that of the conductor level that is being joined.
- M. Termination hardware assemblies:
1. AL/CU lugs connected to aluminum plated or copper buss, shall be secured using a steel bolt, flat washer (two per bolt), Belleville washer and nut.
 2. Copper lugs connected to copper bus, shall be secured using silicon bronze alloy bolt, flat washer (two per bolt), Belleville washer and nut.
 3. The crown of Belleville washers shall be under the nut.
 4. Bolt assemblies shall be torque to Manufacturer recommendation. Where manufacture recommendations are not obtainable, the following values shall be used:
 - a. 1/4" - 20 bolt at 80-inch pounds torque.
 - b. 5/16" - 18 bolt at 180-inch pounds torque.
 - c. 3/8" - 16 bolt at 20-foot pounds torque.
 - d. 1/2" - 13 bolt at 40-foot pounds torque.Fp
 - e. 5/8" - 11 bolt at 55-foot pounds torque.
 - f. 3/4" - 10 bolt at 158-foot pounds torque.

3.06 IDENTIFICATION

- A. Refer to Section 260553: Electrical Identification for additional requirements.
- B. Securely tag all branch circuits. Mark conductors with specified vinyl wrap-around markers. Where more than two conductors run through a single outlet, mark each conductor with the corresponding circuit number.
- C. Color code conductors' size #8 and larger using specified phase color markers and identification tags, with exception of the grounded conductor which must have a continuous white or gray jacket if #6 or smaller.
- D. Provide all terminal strips with each individual terminal identified using specified vinyl markers.
- E. In manholes, pull boxes and handholes, provide tags of the embossed brass type and show the cable type and voltage rating. Attach the tags to the cables with slip-free plastic cable lacing units.

3.07 FIELD QUALITY CONTROL

- A. Independent testing: Contractor shall arrange and pay for the services of an independent Testing Agency to perform all quality control electrical testing required herein. Independent Testing Agency shall meet the requirements as outlined in Section 260010: Basic Electrical Requirements.
- B. Prefunctional testing:
 - 1. Visual and mechanical inspection:
 - a. Compare cable data with Contract Documents.
 - b. Inspect exposed sections of wires and cables for physical damage and proper connections.
 - c. Verify tightness of accessible bolted connections with calibrated torque wrench in accordance with Manufacturer's published data.
 - d. Inspect compression applied connectors for correct cable match and indentation.
 - e. Verify visible cable bend meet or exceed ICEA and Manufacturer's minimum allowable bending radius.
 - f. If cables are terminated through window type current transformers, inspect to verify neutral and ground conductors are correctly placed for operation of protective devices.
 - g. Ensure wire and cable identification has been installed as specified herein.
 - 2. Electrical testing:

- a. Contractor shall perform feeder and branch circuit insulation test after installation and prior to connection to utilization devices such as fixtures, motors, or appliances. Testing shall be as follows:
 - 1) 100% of all feeders 100amp rated and above.
 - 2) 50% of all feeders smaller than 100amps.
 - 3) 10% of all branch circuits at each individual panelboard.
 - b. Perform insulation-resistance test using megohm meter with applied potential of 1000volt DC for a continuous duration of 60-seconds. Test conductors' phase-to-phase and phase-to-ground. Conductors shall test free from short-circuit and ground faults.
 - c. Perform continuity test of all feeder and branch circuits to ensure correct cable connections. Test all neutrals for improper grounds.
 - d. Contractor shall furnish instruments, materials, and labor for these tests.
3. Test values: Investigate resistance values less than 50-megohms.
 4. Furnish test results in typewritten report form for review and inclusion in the operation and maintenance manuals.

END OF SECTION 26 05 19

SECTION 26 05 26
GROUNDING AND BONDING

PART 1 - GENERAL

1.01 SUMMARY

- A. Work included: Labor, materials, and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:
 - 1. Electrical equipment and raceway grounding and bonding.
- B. Related Work: Consult all other Sections, determine the extent and character of related Work, and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.
 - 1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 REFERENCES

- A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:
 - 1. Underwriters Laboratories, Inc. (UL):
 - UL 467; Grounding and Bonding Equipment.
 - 2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - IEEE No. 142; Recommended Practice for Grounding of industrial and Commercial Power Systems.
 - IEEE No. 81 Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.

1.03 SYSTEM DESCRIPTION

- A. Resistance:
 - 1. Resistance from the main switchboard ground bus through the ground electrode to earth shall not exceed 5-OHMS unless otherwise noted.
 - 2. Resistance from the farthest panelboard, switchboard, etc. ground bus through the ground electrode to earth shall not exceed 20-OHMS

1.04 SUBMITTALS

- A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
3. Submit Manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new, unused, and currently under production.
- B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

PART 2 - PRODUCTS

2.01 GROUND CONDUCTORS

- A. Refer to Specification Section 260519: Building Wire and Cable for conductor specifications.
- B. General purpose insulated:
 1. UL approved and code sized copper conductor, with dual rated THHN/THWN insulation, color identified green.
 2. Where continuous color-coded conductors are not commercially available, provide a minimum 4" long color band with green, non-aging, plastic tape in accordance with CEC.
- C. Bare conductors in direct contact with earth or encased in concrete: #4/0 AWG copper minimum, U.O.N.
- D. Bonding pigtails: Insulated copper conductor, identified green, sized per code, and provide with termination screw or lug. Provide solid conductors for #10 AWG or smaller and stranded conductors for #8 AWG or larger.

2.02 INSULATED GROUNDING BUSHINGS

- A. Plated malleable iron or steel body with 150-degree Centigrade molded plastic insulating throat and lay-in grounding lug.

2.03 CONNECTIONS TO PIPE

- A. For cable to pipe: UL and CEC approved bolted connection.

2.04 CONNECTIONS TO STRUCTURAL STEEL, GROUND RODS OR SPLICES

- A. Where required by the Drawings, grounding conductors shall be spliced together, connected to ground rods or connected to structural steel using exothermic welds or high-pressure compression type connectors.

1. Exothermic welds shall be used for cable-to-cable and cable-to-ground rod and for cable to structural steel surfaces. Exothermic weld kits shall be as manufactured by Cadweld or equal. Each particular type of weld shall use a kit unique to that type of weld.
2. High-pressure compression type connectors shall be used for cable-to-cable and cable-to-ground rod connections.

2.05 EXTRA FLEXIBLE, FLAT BONDING JUMPERS

- A. Where required by Code, indicated on the Drawing, and specified herein.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall thoroughly examine Project site conditions for acceptance of grounding system installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.02 INSTALLATION

- A. Grounding electrode conductor: Provide grounding electrode conductor as indicated on the Drawings or sized per CEC Article 250, whichever is greater.
- B. Equipment bonding/grounding:
 1. Provide a CEC sized insulated copper ground conductor in all 120volt AC through 600volt AC feeder and branch circuit distribution conduits and cables.
 2. Provide a separate grounding bus at panelboards, switchboards. Connect all metallic enclosed equipment so that with maximum fault current flowing, shall be maintained at not more than 35volts above ground.
 3. Conduit terminating in concentric, eccentric, or oversized knockouts at panelboards, cabinets, gutters, etc. shall have grounding bushings and bonding jumpers installed interconnecting all such conduits.
 4. Provide bonding jumpers across expansion and deflection couplings in conduit runs, pipe connections to water meters, dielectric couplings in metallic cold-water piping system.
 5. Provide internal ground wire in flexible conduit connected at each end via grounding bushing.

3.03 FIELD QUALITY CONTROL

- A. Independent Testing: Contractor shall arrange and pay for the services of an independent Testing Agency to perform all quality control electrical testing required herein.
- B. Prefunctional testing:
 1. Provide Testing Agency with Contract Documents for their review prior to the commencement of ground testing.

2. Visual and mechanical inspection:
 - a. Check tightness and welds of all ground conductor terminations.
 - b. Verify installation complies with the intent of the Contract Documents
3. A typewritten record of measured resistance values shall be submitted for review and included with the operation and maintenance manual furnished to the Owner at the time of Project closeout and before certificate of final payment is issued.

END OF SECTION 26 05 26

SECTION 26 05 29
ELECTRICAL HANGERS AND SUPPORTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Work included: Labor, materials, and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:
 - 1. Conduit supports.
 - 2. Equipment supports.
 - 3. Fastening hardware.
- B. Related Work: Consult all other Sections, determine the extent and character of related Work, and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.
 - 1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
 - 2. Division 05: Miscellaneous metals. Hangers for electrical equipment.
 - 3. Division 09: Ceiling suspension systems. Slack support wires.

1.02 REFERENCES

- A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:
 - 1. Underwriters Laboratories, Inc. (UL):
 - UL 2239; Hardware for the Supports of Conduit, Tubing and Cable.

1.03 SYSTEM DESCRIPTION

- A. Provide devices specified in this Section and related Sections for support of electrical equipment furnished and installed under Division 26.
- B. Provide support systems that are adequate for the weight of equipment, conduit and wiring to be supported.

1.04 SUBMITTALS

- A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:
 - 1. Data/catalog cuts for each product and component specified herein.
 - 2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

3. Submit Manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new, unused, and currently under production.
- B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Concrete fasteners:

- a. Phillips "Red-Head".
- b. Remington.
- c. Ramset.

2. Concrete inserts and construction channel:

- a. Unistrut Corp.
- b. GS Metals "Globe Strut."
- c. Thomas & Betts "Kindorf" Corp.

3. Conduit straps:

- a. O-Z/Gedney.
- b. Erico "Caddy" Fastening Products.
- c. Thomas & Betts "Kindorf" Corp.

- B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.02 CONCRETE FASTENERS

- A. Provide expansion-shield type concrete anchors.
- B. Provide powder driven concrete fasteners with washers. Obtain approval by Architect and Structural Engineer prior to use.

2.03 CONCRETE INSERTS

- A. Provide pressed galvanized steel, concrete spot insert, with oval slot capable of accepting square or rectangular support nuts of $\frac{1}{4}$ inch to $\frac{1}{2}$ inch diameter thread for rod support.

2.04 THREADED ROD

- A. Provide steel threaded rod, sized for the load unless otherwise noted on the Drawings or in the Specifications.

2.05 CONSTRUCTION CHANNEL

- A. Provide 1.5-inch by 1.5-inch, 12-gauge galvanized steel channel with 17/32-inch diameter bolt holes and 1-1/2 inch on center in the base of the channel.

2.06 CONDUIT STRAPS

- A. One-hole strap, steel, or malleable iron, with malleable iron clamp-back spacer for surface mounted wall and ceiling applications.
 - 1. Use malleable strap with spacers for exterior and wet locations.
 - 2. Use steel strap without spacers for interior locations.
- B. Steel channel conduit strap for support from construction channel.
- C. Steel conduit hanger for pendant support with threaded rod
- D. Steel wire conduit support strap for support from independent #12-gauge hanger wires.

PART 3 - EXECUTION**3.01 EXAMINATION**

- A. Contractor shall thoroughly examine Project site conditions for acceptance of supporting device installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.02 PREPARATION

- A. Coordinate size, shape, and location of concrete pads with Division 03, Cast-in-place concrete.
- B. Layout support devices to maintain headroom, neat mechanical appearance and to support the equipment loads.
- C. Where indicated on the Contract Documents, install freestanding electrical equipment on concrete pads.

3.03 INSTALLATION

- A. Furnish and install supporting devices as noted throughout Division 26.
- B. Electrical device and conduit supports shall be independent of all other system supports that are not structural elements of the building, unless otherwise noted.
- C. Fasten hanger rods, conduit clamps, outlet, and junction boxes to building structure using precast inserts, expansion anchors, preset inserts, or beam clamps.

- D. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster or gypsum board partitions and walls.
- E. Use expansion anchors or preset inserts in solid masonry walls.
- F. Use self-drilling anchors, expansion anchor or preset inserts on concrete surfaces.
- G. Use sheet metal screws in sheet metal studs and wood screws in wood construction.
- H. Do not fasten supports to piping, ductwork, mechanical equipment, conduit, or acoustical ceiling suspension wires.
- I. Do not drill structural steel members unless first approved in writing by the Architect or Structural Engineer.
- J. Fabricate supports from structural steel or steel channel, rigidly welded, or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.
- K. Install surface-mounted cabinets and panelboards with minimum of four anchors. Provide additional support backing in stud walls prior to sheet rocking as required to adequately support cabinets and panels.
- L. Bridge studs top and bottom with channels to support flush mounted cabinets and panelboards in stud walls.

3.04 ERECTION OF METAL SUPPORTS

- A. Cut, fit and place miscellaneous metal fabrications accurately in location, alignment and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS "Structural Welding Code."

3.05 WOOD SUPPORTS

- A. Cut, fit, and place wood grounds, nailers, blocking and anchorage accurately in location, alignment and elevation to support and anchor electrical materials and equipment.

3.06 ANCHORAGE

- A. All floor mounted, free standing electrical equipment such as transformers, switchboards, distribution boards, etc. shall be securely fastened to the floor structure.
- B. Anchorage of electrical equipment shall comply with the seismic requirements as outlined in Section 260010: Basic Electrical Requirements.

END OF SECTION 26 05 29

**SECTION 26 05 31
CONDUIT**

PART 1 - GENERAL

1.01 SUMMARY

- A. Work included: Labor, materials, and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:
 - 1. Rigid steel conduit and fittings.
 - 2. PVC insulated rigid steel conduit and fittings.
 - 3. Intermediate metal conduit and fittings.
 - 4. Electrical metallic tubing and fittings.
 - 5. Flexible metallic conduit and fittings.
 - 6. Liquidtight flexible metallic conduit and fittings.
 - 7. Miscellaneous conduit fittings and products.

- B. Related Work: Consult all other Sections, determine the extent and character of related Work, and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.
 - 1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
 - 2. Division 01: Cutting and patching.
 - 3. Division 07: Sheet metal flashing and trim.
 - 4. Division 09: Painting. Exposed conduit and other devices.

1.02 REFERENCES

- A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:
 - 1. American National Standards Institute, Inc. (ANSI):
 - ANSI C80.1; Rigid Steel Conduit, Zinc-Coated.
 - ANSI C80.3; Electrical Metallic Tubing, Zinc Coated.
 - ANSI C80.5; Rigid Aluminum Conduit.
 - ANSI/ TIA-569-D Telecommunications Pathways and Spaces.

 - 2. Underwriters Laboratories, Inc. (UL):

UL 1;	Flexible Metal Conduit.
UL 6;	Rigid Metal Conduit.
UL 360;	Liquid-Tight Flexible Steel Conduit.
UL 514B;	Conduit, Tubing and Cable Fittings.
UL 635;	Insulating Bushings.
UL 797;	Electrical Metallic Tubing - Steel.
UL 1242;	Intermediate Metal Conduit - Steel.

3. National Electrical Manufacturer Association (NEMA):

NEMA RN1;	PVC Externally coated Galvanized Rigid Steel Conduit.
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1.03 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
3. Submit Manufacturer's installation instruction. Provide written instructions for raceway products requiring glues, special tools, or specific installation techniques.

1.04 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new, unused, and currently under production.
- B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted and approved.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Metal conduit:
 - a. Allied Tube and Conduit Co.
 - b. Triangle PWC, Inc.
 - c. Western Tube and Conduit Corp.

- d. Spring City Electrical Manufacturing Co.
- e. Alflex Corp.
- f. American Flexible Metal Conduit Co.
- g. Anaconda.

2. Fittings:

- a. Appleton Electric Co.
- b. OZ/Gedney.
- c. Thomas & Betts Corp.
- d. Spring City Electrical Manufacturing Co.

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.02 GALVANIZED RIGID STEEL CONDUIT (GRS)

- A. Conduit: Full weight, threaded, hot-dip galvanized steel, conforming to ANSI C80.1 and UL 6.
- B. Standard threaded couplings, locknuts, bushings, and elbows: Only materials of steel or malleable iron are acceptable. Locknuts shall be bonding type with sharp edges for digging into the metal wall of an enclosure; provide two locknuts at each box or can, inside and outside.
- C. Three-piece couplings: Hot dip galvanized, cast malleable iron.
- D. Insulating bushings: Threaded polypropylene or thermosetting phenolic rated 150-degree C minimum.
- E. Insulated grounding bushings: Threaded cast malleable iron body with insulated throat and steel "lay-in" ground lug with compression screw.
- F. Insulated metallic bushings: Threaded cast malleable iron body with plastic insulated throat rated 150-degrees C.
- G. All fittings and connectors shall be threaded.

2.03 PVC INSULATED GALVANIZED RIGID STEEL CONDUIT (PVC GRS)

- A. Conduit: Full weight, threaded, hot-dip galvanized steel, conforming to ANSI C80.1 and NEMA RN-1 with nominal 20 or 40 mil thermoplastic vinyl coating, heat fused and bonded to the exterior of the conduit.
- B. Fittings: Conduit couplings and connectors shall be as specified for galvanized rigid steel conduit and shall be factory PVC coated with an insulating jacket equivalent to that of the coated material.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

- A. Conduit: Hot dip galvanized steel meeting the requirements of CEC Article 345 and conforming to ANSI C80.6 and UL 1242.
- B. Fittings: Conduit couplings, connector and bushing shall be as specified for galvanized rigid steel conduit. Integral retractable type IMC couplings are also acceptable.

2.05 ELECTRICAL METALLIC TUBING (EMT)

- A. Conduit: Shall be formed of cold rolled strip steel, electrical resistance welded continuously along the longitudinal seam and hot dip galvanized after fabrication. Conduit shall conform to ANSI C80.3 Specifications and shall meet UL requirements.
- B. Set screw type couplings: Hot dip galvanized, steel, UL listed concrete tight. Use set screw type couplings with four setscrews each of conduit sizes over 2 inches. Setscrews shall be of case-hardened steel with hex-head and cup point to firmly seat in wall of conduit for positive grounding.
- C. Set screw type connectors: Hot dip galvanized, steel, UL listed concrete tight with male hub and insulated plastic throat, 150-degree C temperature rated. Setscrew shall be same as for couplings.
- D. Raintight couplings: Hot dip galvanized, steel; UL listed raintight and concrete tight, using gland and ring compression type construction.
- E. Raintight connectors: Hot dip galvanized, steel, UL listed raintight and concrete tight, with insulated throat, using gland and ring compression type construction.

2.06 FLEXIBLE METALLIC CONDUIT (FMC)

- A. Conduit: Shall be fabricated in continuous lengths from galvanized steel strip, spirally wound and formed to provide an interlocking design and conforming to UL 1.
- B. Fittings: Connectors shall be of the single screw clamp variety with steel or cast malleable iron bodies and threaded male hubs with insulated throats. Exception: Pressure cast screw-in connectors shall be acceptable for luminaire connection in suspended ceilings and cut-in outlet boxes within existing furred walls.

2.07 LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT (LFMC)

- A. Conduit: Shall be fabricated in continuous lengths from galvanized steel strips, interlocking spirally wound, covered with extruded liquidtight jacket of polyvinyl chloride (PVC) and conforming to UL 360. Provide conduit with a continuous copper-bonding conductor wound spirally between the convolutions.
- B. Fittings: Connector body and gland nut shall be of cadmium plated steel or cast malleable iron, with tapered, male, threaded hub; insulated throat and neoprene "O" ring gasket recessed into the face of the stop nut. The clamping gland shall be of molded nylon with an integral brass push-in ferrule.

2.08 MISCELLANEOUS CONDUIT FITTINGS AND PRODUCTS

- A. Watertight conduit entrance seals: Steel or cast malleable iron bodies and pressure clamps with PVC sleeve, neoprene sealing grommets and PVC coated steel pressure rings. Fittings shall be supplied with neoprene sealing rings between the body and PVC sleeve.
- B. Watertight cable sealing bushings: One piece, compression molded sealing ring with PVC coated steel pressure disks, stainless steel sealing screws and zinc plated cast malleable iron locking collar.
- C. Expansion fittings: Multi-piece unit comprised of a hot dip galvanized malleable iron or steel body and outside pressure bussing designed to allow a maximum of 4" conduit movement (2" in either direction). Furnish with external braid tinned copper bonding jumper. Unit shall be UL listed for wet or dry locations.
- D. Expansion/deflection couplings: Multi-piece unit comprised of a neoprene sleeve with internal flexible tinned copper braid attached to bronze end couplings with stainless steel bands. Coupling shall accommodate 0.75-inch deflection, expansion or contraction in any direction and allow 30-degree angular deflections. Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber jacket and stainless-steel jacket clamps. Unit shall comply with UL467 and UL514. Manufacturer shall be OZ/Gedney Type DX, Steel City Type EDF or equal.
- E. Fire rated penetration seals:
 - 1. UL building materials directory classified.
 - 2. Conduit penetrations in fire rated separation shall be sealed with a UL classified fill, void or cavity material.
 - 3. The fire rated sealant material shall be the product best suited for each type of penetration and may be a caulk, putty, composite sheet, or wrap/strip.
- F. Standard products not herein specified:
 - 1. Provide listing of standard electrical conduit hardware and fittings not herein specified for approval prior to use or installation, i.e. locknuts, bushings, etc.
 - 2. Listing shall include Manufacturers name, part numbers and a written description of the item indicating type of material and construction.
 - 3. Miscellaneous components shall be equal in quality, material and construction to similar items herein specified.
- G. Hazardous area fittings: UL listed for the application.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall thoroughly examine Project site conditions for acceptance of conduit system installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.02 APPLICATION

- A. Galvanized rigid steel conduit (GRS) can be used in the following applications:
 - 1. For feeders and branch circuits located indoors, concealed or exposed above suspended ceilings, in damp/wet locations, in crawl spaces, in attics, chases, furred spaces, equipment rooms, loading docks or in hazardous locations in accordance with CEC and local Codes.
 - 2. For feeders and branch circuits concealed in concrete floors and walls when not in contact with earth.
 - 3. For use where conduit is subject to physical damage.
 - 4. For feeders and branch circuits installed exposed on the roof.
- B. PVC insulated galvanized rigid steel conduit can be used in the following applications:
 - 1. Use 40-mil coating for feeders and branch circuits in damp or wet locations.
 - 2. Use 20- or 40-mil for feeders and branch circuits concealed in concrete walls or slabs in contact with earth.
 - 3. Use 20- or 40-mil for runs beneath floor slabs on grade.
 - 4. Use 40-mil for all below grade penetrations through floor slabs on grade or exterior walls.
- C. Intermediate metal conduit (IMC): Can be used for the same application as galvanized rigid steel conduit as specified herein, except for hazardous locations prohibited by CEC or Local Codes.
- D. Electrical metallic tubing (EMT): Can be used exposed or concealed for interior electrical feeders 4" and smaller, interior power and lighting branch circuits and low tension distribution system where run above suspended ceilings, in concrete slabs and walls not in contact with earth; in stud walls, furred spaces and crawl spaces. EMT shall not be installed exposed below 8 feet above the finish floor except within electrical, communication or signal rooms or closets (subject to physical damage).
- E. Flexible metallic conduit (FMC): Can be used only in dry locations for connections from an adjacent outlet box or conduit to all motors, transformers, vibrating equipment or machinery, controllers, solenoid valves, float and flow switches or similar devices and to luminaires installed in suspended ceilings.
- F. Liquidtight flexible metallic conduit (LFMC): Can be used in wet or damp locations for connections from adjacent outlet box or conduit to all motors, transformers, vibrating

equipment or machinery, controllers, solenoid valves, float and flow switches or similar devices. These areas are typically food preparation and dishwashing areas, sump wells, loading docks, pump rooms, exterior areas, etc.

- G. Fire-Resistive Systems: Refer to CEC Article 728. All devices utilized, mountings, and supports shall be listed as part of the fire-resistive system.

3.03 PREPARATION

- A. Locations of conduit runs shall be planned in advance of the installation and coordinated with ductwork, plumbing, ceiling and wall construction in the same areas and shall not unnecessarily cross other conduits or pipe, nor prevent removal of ceiling tiles or panels, nor block access to mechanical or electrical equipment.
- B. Where practical, install conduits in groups in parallel vertical or horizontal runs and at elevations that avoid unnecessary offsets.
- C. All conduits shall be run parallel or at right angles to the centerlines of columns and beams, whether routed exposed, concealed above suspended ceiling or in concrete slabs.
- D. Conduits shall not be placed closer than 12-inches to a flue, parallel hot water, steam line or other heat producing source or three inches from such lines when crossing perpendicular to the runs.
- E. Communications conduits shall not be placed closer than 12 inches to power, a flue, parallel hot water, steam line or other heat producing source or three inches from such lines when crossing perpendicular to the runs.
- F. Exposed conduit installation shall not encroach into the ceiling height headroom of walkways or doorways. Where possible, install horizontal raceway runs above water and below steam piping.
- G. The largest trade size conduits in concrete floor and wall slabs shall not exceed 1/3 the floor or wall thickness and conduits shall be spaced a minimum of three conduit diameters apart unless otherwise noted on the Drawings. All conduits shall be installed in the center of concrete slabs or wall and shall not be placed between reinforcing steel and the bottom of floor slabs.
- H. In long runs of conduit, provide sufficient pull boxes inside buildings to facilitate pulling wires and cables, with spacing not to exceed 150-feet. Support pull boxes from structure independent of conduit supports. These pull boxes are not indicated on the Drawings.
- I. Provide all reasonably inferred standard conduits fitting and products required to complete conduit installation to meet the intended application whether noted, indicated, or specified in the Contract Documents or not.
- J. Connect recessed luminaires to conduit runs with maximum six feet of flexible metal conduit.

3.04 INSTALLATION

- A. Install conduit in accordance with Manufacturer's written instructions, as indicated on Drawings and as specified herein.
- B. Minimum Conduit Size: Unless otherwise noted herein or on Drawings, minimum conduit size shall be 3/4" for interior applications and 1" for exterior and underground applications.
- C. Minimum Communication and Signal Conduit Size: Unless otherwise noted herein or on Drawings, minimum conduit size shall be 1" for interior applications and 2" for exterior and underground applications.
- D. All conduit sizes indicated on the Drawings are sized for copper conductors with THHN/THWN insulation. If conductor type or size is changed the Contractor shall be responsible for resizing conduits upward to meet Code.
- E. All communication and signal conduit sizes indicated on the Drawings are sized for 40% fill or less for category 6 or 6A cable. If cable type or size is changed the Contractor shall be responsible for resizing conduits upward to meet a maximum 40% fill.
- F. In general, all conduit work shall be concealed where possible. Exceptions shall be electrical, communication and mechanical rooms, exposed ceiling areas, and parking garages.
- G. Conduit connections to motors and surface cabinets shall be concealed, except for electrical, communication and mechanical rooms, or unless exposed Work is clearly called for on the Drawings.
- H. Install conduits in complete runs before pulling in cables or wires.
- I. Install conduit free from dented, bruises or deformations. Remove and replace any damaged conduits with new undamaged material.
- J. Conduits shall be well protected and tightly covered during construction using metallic bushings and bushing "pennies" to seal open ends.
- K. In making joints in rigid steel conduit, ream conduit smooth after cutting and threading. Coat all field-threaded joints with UL approved conductive type compound to ensure low resistance ground continuity through conduit and to prevent seizing and corrosion.
- L. Clean any conduit in which moisture or any foreign matter has collected before pulling in conductors. Paint all field-threaded joints to prevent corrosion.
- M. In all empty conduits or ducts, install a "True Tape" conduit measuring tape line to provide overall conduit length for determining length of cables/conductors for future use.
- N. Conduit systems shall be mechanically and electrically continuous throughout. Install code size, insulated, copper, green-grounding conductors in all conduit runs for branch circuits and feeders. This conductor is not indicated on the Drawings. Refer to Section 260526: Grounding and Bonding.
- O. Metallic conduit shall not be in contact with other dissimilar metal pipes (i.e. plumbing).

- P. Make bends with standard conduit bending hand tool or machines. The use of any item not specifically designed for the bending of electrical conduit is strictly prohibited.
- Q. A run of conduit between terminations at wire pulling points shall not contain more than the equivalent of four quarter bends (360-degrees, total).
- R. A run of communications and signal conduit between terminations at wire pulling points shall not contain more than the equivalent of two quarter bends (180-degrees, total).

3.05 PENETRATIONS

- A. Locate penetrations and holes in advance where they are proposed in the structural sections such as footings, beams, wall, etc. Penetrations are acceptable only when the following occurs:
 - 1. Where indicated on the Structural Drawings.
 - 2. As approved by the Structural Engineer prior to construction and after submittal of Drawing showing location, size, and position of each penetration.
- B. Cutting or holes:
 - 1. Cut holes through concrete, masonry block or brick floors and floors of structure with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Structural Engineer as required by limited working space. Obtain the approval of the Structural Engineer prior to drilling through structural sections.
 - 2. Provide sleeves or "can outs" for cast-in-place concrete floors and walls. Following conduit installation, seal all penetrations using non-iron bearing, chloride free, non-shrinking, dry-pack grouting compounds; or fire rated penetration-sealing materials.
 - 3. Cut holes for conduit penetrations through non-concrete and non-masonry walls, partitions, or floors with a hole saw. The hole shall be only as large as required to accommodate the size of the conduit.
 - 4. Provide single piece escutcheon plates around all exposed conduit penetrations in public places.
- C. Sealing:
 - 1. Non-rated penetrations: Pack opening around conduits with non-flammable insulating material and seal with gypsum wallboard taping compound.
 - 2. Fire stop: Where conduits, wireways and other electrical raceways pass through fire rated partitions, walls, smoke partitions or floor; install a UL classified fire stop material to provide an effective barrier against the spread of fire, smoke, and gases. Completely fill and seal clearances between raceways and openings with the fire stop material.

- D. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight as specified in Division 07: Sealants and Caulking.
1. Install specified watertight conduit entrance seals at all below grade wall and floor penetrations. Conduits penetrating exterior building walls and building floor slab shall be PVC coated rigid galvanized steel.
 2. For roof penetrations furnish and install roof flashing, counter flashing and pitch-pockets as specified under Roofing and Sheet Metal Sections of the Specifications.
 3. Provide membrane clamps and cable sealing fittings for any conduit that horizontally penetrates the waterproof membrane.
 4. Conduits that horizontally penetrate a waterproof membrane shall fall away from and below the penetration on the exterior side a minimum of two times the conduit diameters.

3.06 CONCEALED IN CONCRETE

- A. Install conduits approximately in the center of the slab so that there will be a minimum of 3/4-inch of concrete around the conduits.
- B. Installation of conduit in structural concrete that is less than three inches thick is prohibited. Topping slabs, maintenance pads and curbs are exempted.
- C. Tie conduits to reinforcing rods or otherwise secure them to prevent sagging or shifting during concrete placement. Run conduit larger than 1-inch trade size, parallel with or at right angles to the main reinforcement; where at right angles to the reinforcement, the conduit shall be close to one of the supports of the slab.
- D. Where nonmetallic conduit or tubing is used, raceways must be converted to PVC coated rigid steel conduit before rising above floor.
- E. Make couplings and connections watertight.
- F. Protect stub-ups from damage where conduits rise from floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

3.07 TERMINATIONS AND JOINTS

- A. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings except as otherwise indicated.
- B. Raceways shall be joined using specified couplings or transition couplings where dissimilar raceway systems are joined.
- C. Conduits shall be securely fastened to cabinets, boxes and gutters using two locknuts and an insulating bushing or specified insulated connectors. Where joints cannot be made tight,

- use bonding jumpers to provide electrical continuity of the raceway system. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors. Install grounding bushings or bonding jumpers on all conduits terminating at concentric or eccentric knockouts.
- D. Conduit terminations exposed at weatherproof enclosures and cast outlet boxes shall be made watertight using specified connectors and hubs.
 - E. Stub-up connections: Extend conduits through concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs and set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; flexible metal conduit may be used 6 inches above the floor. Where equipment connections are not made under this contract, install screwdriver operated threaded flush plugs with floor.
 - F. Install specified cable sealing bushings on all conduits originating outside the building walls and terminating in switchgear, cabinets, or gutters inside the building. Install cable sealing bushings or raceway seal for conduit terminations in all grade level or below grade exterior pull, junction, or outlet boxes.
 - G. Raceway seal: Inject into wire filled raceways, a pre-formulated rigid 2 lbs. density polyurethane foam which expands a minimum 35 times its original bulk. Foam shall have the physical properties of water vapor transmission of 1.2 to 3.0 perms: water absorption less than 2% by volume, fungus and bacterial resistant. Foam shall permanent seal against water, moisture, insects, and rodents. Install raceway sealing foam at the following points:
 - 1. Where conduits pass from warm locations to cold locations to prevent passage of water vapor (such as refrigerated spaces, constant temperature rooms, air-conditioned spaces, etc.).
 - 2. Where conduits enter buildings from below grade.
 - H. Install expansion couplings where any conduit crosses a building separation or expansion joint as follows:
 - 1. Conduits three inches and larger, shall be rigidly secured to the building structure on opposite sides of a building expansion joint and provided with expansion or deflection couplings. Install the couplings in accordance with the Manufacturer's recommendations.
 - 2. Conduits smaller than three inches shall be rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes on both sides of the joint. Connect conduits to junction boxes with 15 inches of slack flexible conduit. Flexible conduit shall have a green copper ground-bonding jumper installed. For concrete embedded conduit, use expansion and deflection couplings as specified above for three inches and larger conduits.

- I. Use short length (maximum of 6ft) of the appropriate FMC or LFMC conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission. Provide liquidtight flexible metal conduit for installation in exterior locations, moisture or humidity-laden atmosphere, corrosive atmosphere, water hose or spray wash-down operations and locations subject to seepage or dripping of oil, grease, or water. Provide a green ground wire with FMC or LFMC conduit.

3.08 SUPPORTS

- A. Provide supports for raceways as specified in Section 260529: Electrical Hangers and Supports.
- B. All raceways systems shall be secured to building structures using specified fasteners, clamps and hangers spaced according to the CEC.
- C. Support single runs of conduit using one-hole pipe straps. Where run horizontally on walls in damp or wet locations, install "clamp backs" to space conduit off the surface.
- D. Multiple conduit runs shall be supported using "trapeze" hangers fabricated from specified construction channel, mounted to 3/8-inch diameter, threaded steel rods secured to building structures. Fasten conduit to construction channel with standard one-hole pipe clamps or the equivalent. Provide lateral seismic bracing for hangers.
- E. Individual 3/4" conduits installed above suspended ceilings may be attached to the ceiling's hanger wire using spring steel support clips provided that not more than two conduits are attached to any single support wire.
- F. Support exposed vertical conduit runs at each floor level, independent of cabinets or switches to which they run, by means of acceptable supports.
- G. Fasteners and supports in solid masonry and concrete:
 1. Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
 2. After concrete installation:
 - a. Steel expansion anchors not less than ¼ inch bolt size and not less than 1-1/8" embedment.
 - b. Power set fasteners not less than ¼ inch diameter with depth of penetration not less than three inches.
 - c. Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.
- H. Hollow masonry: Toggle bolts are permitted. Bolts supported only by masonry block are not acceptable.
- I. Metal structures: Use machine screw fasteners or other devices specifically designed and approved for the application.

END OF SECTION 26 05 31

SECTION 26 05 33
BOXES

PART 1 - GENERAL

1.01 SUMMARY

- A. Work included: Labor, materials, and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:
 - 1. Wall and ceiling outlet boxes.
 - 2. Pull and junction boxes.
- B. Related Work: Consult all other Sections, determine the extent and character of related Work, and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.
 - 1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
 - 2. Division 08: Access doors. Wall and ceiling access doors.

1.02 REFERENCES

- A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified.
 - 1. American National Standards Institute/National Electrical Manufacturer Association:
 - ANSI/NEMA OS-1; Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
 - ANSI/NEMA OS-2; Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
 - NEMA 250; Enclosures for Electrical Equipment (1000 volts maximum).
 - 2. Underwriters Laboratories (UL):
 - UL 50; Enclosures for Electrical Equipment.
 - UL 514A; Metallic Outlet Boxes.
 - UL 1773; Termination Boxes.

1.03 SUBMITTALS

- A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:
 - 1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.

2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
3. Submit Manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new, unused, and currently under production.
- B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.
 1. Outlet and junction boxes:
 - a. Spring City Electrical Manufacturing Co.
 - b. Thomas & Betts Corp.
 - c. Raco, Inc.
 2. Pullboxes:
 - a. Circle AW Products.
 - b. Hoffman Engineering Co.
- B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.02 OUTLET BOXES

- A. Standard outlet box:
 1. Provide galvanized, one-piece die formed or drawn steel or welded, knockout type box of size and configuration best suited to the application indicated on the Drawings.
 2. 4-inch square by 2-1/4-inch deep shall be minimum box size.
 3. ANSI/NEMA OS 1.
- B. Cast metal outlet body:
 1. Provide 4-inch round, galvanized cast iron alloy with threaded hubs and mounting lugs as required.
 2. Provide boxes with cast cover plates of the same material as the box and neoprene cover gaskets.

- C. Conduit outlet body: Provide malleable iron, oblong conduit outlet bodies with threaded conduit hubs and neoprene gasket, cast iron covers.

2.03 PULL AND JUNCTION BOXES

A. Sheet metal pull and junction box:

1. Provide standard outlet or concrete ring boxes wherever possible; otherwise use minimum 16-gauge galvanized sheet metal, NEMA 1 boxes, sized to Code requirements with covers secured by cadmium plated machine screws located 6 inches on centers.
2. ANSI/NEMA OS 1.

- B. Flush mounted pullboxes and junction boxes: Provide overlapping covers with flush head cover retaining screws, prime coated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall thoroughly examine Project site conditions for acceptance of box installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.02 PREPARATION

- A. Install all outlet boxes flush with building walls, ceilings, and floors except where boxes are installed in mechanical and electrical rooms, in cabinetry, above accessible ceilings or where exposed Work is called for on the Drawings.
- B. Locate pullboxes and junction boxes in concealed locations above removable ceilings or exposed in electrical rooms, utility rooms or storage areas.
- C. Install outlet boxes at the locations and elevations indicated on the Drawings or specified herein. Make adjustments to locations as required by structural conditions and to suit coordination requirements of other trades.
- D. Locate switch outlet boxes on the latch side of doorways unless otherwise indicated.
- E. Locate outlet boxes above hung ceilings having concealed suspension systems, adjacent to openings for removable recessed luminaires.
- F. Do not install outlet boxes back-to-back, separate boxes by at least 6". In fire-rated walls separate boxes by at least 24" and wall stud.
- G. Adjust position of outlet boxes in finished masonry walls to suit masonry course lines. Coordinate cutting of masonry walls to achieve neat openings for boxes.

3.03 INSTALLATION

- A. Install boxes in accordance with Manufacturer's written instructions, as indicated on Drawings and as specified herein.

- B. Locate electrical boxes as indicated on Drawings and as required for splices, taps, wire pulling, equipment connections and Code compliance.
- C. Install junction or pullboxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Note that these boxes are not indicated on the Drawings.
- D. Install raised covers (plaster rings) on all outlet boxes in stud walls or in furred, suspended, or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.
- E. Leave no unused openings in any box. Install close-up plugs as required to seal openings.
- F. Provide cast metal boxes with gasketed cast metal cover plates where boxes are exposed in damp or wet locations.
- G. Welded outlet boxes shall only be used in concealed interior installations.
- H. Provide an access panel in permanent ceiling or wall where boxes are installed and will be inaccessible.
- I. For boxes mounted in exterior walls, make sure that there is insulation behind outlet boxes to prevent condensation in boxes.
- J. For outlets mounted above counters, benches or backsplashes, coordinate location and mounting heights with built-in units. Adjust mounting height to agree with required location for equipment served.
- K. Use conduit outlet bodies to facilitate pulling of conductors or to make changes in conduit direction only. Do not make splices in conduit outlet bodies.
- L. Add additional sheet rock as necessary to maintain original fire rating of walls where boxes are installed.
- M. Install galvanized steel coverplates on boxes in unfinished areas, above accessible ceilings and on surface mounted outlets.

3.04 SUPPORTS

- A. Provide boxes installed in metal stud walls with brackets designed for attaching directly to the studs or mount boxes on specified box supports.
- B. Mount boxes, installed in suspended ceilings of gypsum board or lath and plaster construction, to 16-gauge metal channel bars attached to main ceiling runners.
- C. Support boxes independently of conduit system.
- D. Support boxes, installed in suspended ceilings supporting acoustical tiles or panels, directly from the structure above wherever pendant mounted luminaires are to be installed from the box.
- E. Support boxes mounted above suspended acoustical tile ceilings, directly from the structure above.

END OF SECTION 26 05 33

SECTION 26 05 53
ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Work included: Labor, materials, and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:
 - 1. Electrical equipment nameplates.
 - 2. Panelboard directories.
 - 3. Wire and cable identification.
 - 4. Junction box identification.
 - 5. Inscribed device coverplates.
- B. Related Work: Consult all other Sections, determine the extent and character of related Work, and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.
 - 1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
 - 2. Division 09: Painting.

1.02 SUBMITTALS

- A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:
 - 1. Data/catalog cuts for each product and component specified herein.
 - 2. Schedules for nameplates to be furnished.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.
 - 1. Conduit and wire markers:
 - a. Thomas & Betts Corp.
 - b. Brady.
 - c. Griffolyn.
 - 2. Inscription Tape:

- a. Kroy.
- b. Merlin.

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.02 NAMEPLATES

- A. Type NP: Engraved, plastic laminated labels, signs, and instruction plates. Engrave stock melamine plastic laminate 1/16-inch minimum thickness for signs up to 20-square inches or 8-inches in length; 1/8-inch thick for larger sizes. Engraved nameplates shall have white letters and be punched for mechanical fasteners.
- B. Color and letter height as specified in Part 3: Execution.

2.03 PANELBOARD DIRECTORIES (400 AMP OR LESS)

- A. Directories: A 6" x 8" minimum size circuit directory frame and card with clear plastic covering shall be provided inside the inner panel door.
- B. Circuit numbering: Starting at the top, odd numbered circuits in sequence down the left-hand side and even numbered circuits down the right-hand side.

2.04 WIRE AND TERMINAL MARKERS

- A. Provide self-adhering, pre-printed, machine printable or write-on, self-laminating vinyl wrap around strips.
- B. Blank markers shall be inscribed using the printer or pen recommended by Manufacturer for this purpose.

2.05 CONDUCTOR PHASE MARKERS

- A. Colored vinyl plastic electrical tape, 3/4" wide, for identification of phase conductors. Scotch 35 Brand Tape or equal.

2.06 INSCRIBED DEVICE COVERPLATES

- A. Coverplate material shall be as specified in Section 262726: Wiring Devices.
- B. Methods of inscription: (Unless otherwise noted)
 1. Type-on-tape:
 - a. Imprinted or thermal transfer characters onto tape lettering system.
 - b. Tape trimmer.
 - c. Matte finish spray-on clear coating.
 2. Engraving:
 - a. 1/8" high letters.

- b. Paint filled letters finished in black.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall thoroughly examine Project site conditions for acceptance of identification device installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.02 NAMEPLATES

- A. Installation:
 - 1. Degrease and clean surfaces to receive nameplates.
 - 2. Install nameplates parallel to equipment lines.
 - 3. Secure nameplates to equipment fronts using machine screws.
- B. Provide type 'NP' color coded nameplates that present, as applicable, the following information:
 - 1. Equipment or device designation:
 - a. Equipment designations shall conform to the equipment names shown on drawings.
 - 2. Amperage, KVA or horsepower rating, where applicable.
 - 3. Voltage or signal system name.
 - 4. Source of power or control.
- C. Nameplates for power system distribution equipment and devices are to be black.
- D. Minimum letter height shall be as follows:
 - 1. For panelboards, switchboards, battery panels, etc.: ½ inch letters to identify equipment designation. Use ¼ inch letters to identify voltage, phase, wires, etc.
 - 2. For individual circuit breakers, switches and motor starters in panelboards use 3/8-inch letters to identify equipment designation. Use 1/8-inch letters to identify all other.
 - 3. For individual mounted circuit breakers, disconnect switches, enclosed switches and motor starters use 3/8-inch letters to identify equipment designation. Use 1/8" letters to identify all other.

3.03 PANELBOARD DIRECTORIES (400AMP OR LESS)

- A. Provide typewritten directories arranged in numerical order denoting loads served by room number or area for each circuit.
- B. Verify room numbers or area designation with Project Manager.

- C. Mount panelboard directories in a minimum 6" x 8" metal frame under clear plastic cover inside every panelboard.

3.04 WIRE AND CABLE IDENTIFICATION

- A. Provide wire markers on each conductor in panelboards, pull boxes, outlet, and junction boxes and at load connection. Identify with branch circuit or feeder number for power and lighting circuits and with control wire number as indicated on equipment Manufacturer's Shop Drawings for control wiring.
- B. Provide colored phase markers for conductors as noted in Section 260519: Building Wire and Cable. Apply colored, pressure sensitive plastic tape in half-lapped turns for a distance of 3-inches from terminal points and in boxes where splices or taps are made. Apply the last two laps of tape with no tension to prevent possible unwinding. Do not cover cable identification markings by taping.

3.05 JUNCTION BOX IDENTIFICATION

- A. The cover of junction, pull and connection boxes for both power and signal systems, located above suspended ceilings and below ceilings in non-public areas, shall be clearly marked with a permanent ink felt pen. Identify the circuit(s) (panel designation and circuit numbers) contained in each box, unless otherwise noted or specified.

3.06 INSCRIBED DEVICE COVERPLATE

A. General:

1. Lettering type: Helvetica, 12 point or 1/8" high.
2. Color of characters shall be black.
3. Locate the top of the inscription 1/2" below the top edge of the coverplate.
4. Inscription shall be centered and square with coverplate.

B. Application:

1. Type-on-tape inscriptions shall be provided for the following devices:
 - a. Receptacles.
 - b. Outlets in surface raceways.
 - c. Telecommunication outlets.
2. Engraved inscriptions shall be provided for the following devices:
 - a. Multi-ganged switches.
 - b. Special purpose switches.
3. Type-on-tape installation:

- a. Tape shall be trimmed to the height of the letters.
- b. Trim tape length to ¼-inch back from each edge of coverplate.
- c. Contractor hands shall be clean or covered with surgical type glove prior to application of tape. Tape installations with visible fingerprints or smudges will not be acceptable.

END OF SECTION 26 05 53

SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.01 SUMMARY

- A. Work included: Labor, materials, and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:
 - 1. Wall switches.
 - 2. Occupancy/vacancy sensors, including wallbox and ceiling mounted.
 - 3. Coverplates.
- B. Related Work: Consult all other Sections, determine the extent and character of related Work, and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.
 - 1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
 - 2. Division 03: Cast-in-place concrete.

1.02 REFERENCES

- A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified.
 - 1. National Electrical Manufacturer's Association (NEMA):

NEMA WD-1;	General-Purpose Wiring Devices.
NEMA WD-2;	Semiconductor Dimmers for Incandescent Lamps.
NEMA WD-5;	Specific-Purpose Wiring Devices.
NEMA SSL 7A;	Phase-Cut Dimming for Solid State Lighting
 - 2. Underwriter's Laboratories (UL):

UL 20	General-Use Snap Switches.
UL 231;	Power Outlets.
UL 310;	Electrical Quick-Connect Terminals.
UL 498;	Attachment Plugs and Receptacles.
UL 514A;	Metallic Outlet Boxes.
UL 514D;	Cover Plates for Flush-Mounted Wiring Devices.

UL 943; Ground-Fault Circuit-Interrupters.
UL 1681; Wiring Device Configurations.

1.03 SUBMITTALS

- A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:
 - 1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
 - 2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
 - 3. Provide color finishes for Architect to select from.
 - 4. Submit Manufacturer's installation instructions.
- B. Where inscribed device coverplates are noted on the Drawings or in the Specifications, conform to the requirements of Section 260553: Electrical Identification.

1.04 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new, unused, and currently under production.
- B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

1.05 WARRANTY

- A. Occupancy sensors offered under this Section shall be covered by a 1-year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.
 - 1. Switches, receptacles and coverplates:
 - a. Pass & Seymour.
 - b. Hubbell.
 - c. Leviton.
 - 2. Occupancy/vacancy sensors switches, time switches:

- a. SensorSwitch, Inc.
 - b. Wattstopper
 - c. Cooper Controls "Greengate"
 - d. Leviton
 - e. Hubbell Building Automation, Inc.
3. Floor mounted service boxes:
- a. Legrand

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.02 WALL SWITCHES

- A. Standards: Provide general-purpose 120/277volt AC switches that conform to NEMA WD-1 Specifications.
- B. Color: Device color shall be as selected by the Architect, unless otherwise noted.
- C. Wall switches:
 1. Provide twenty amperes, 120/277volt, Specification grade, toggle handle, quick-make slow-break, quiet type snap switch with silver cadmium alloy contacts, binding head terminal screws, back and side wired with totally enclosed case.
 2. Single-pole, single-throw switches: Hubbell #1221 series, Pass & Seymour #20AC1 series or Leviton #1221 series.
 3. Three-way switches: Hubbell #1223 series, Pass & Seymour #20AC3 series or Leviton #1223 series.

2.03 OCCUPANCY/VACANCY SENSOR SWITCHES

- A. Occupancy sensors: automatic on, automatic off.
- B. Vacancy sensors: manual on, automatic off.
- C. General:
 1. Occupancy sensors shall comply with the latest edition of the California Building Energy Efficiency Standards, California Building Code, Part 6 and be certified by The California Energy Commission. All sensors shall be listed in the most current directory of Certified Occupancy Sensing Devices or be on file with the CEC.
 2. Sensors shall be dual-technology type infrared/ultrasonic or infrared/microphonic or as specified herein.

3. Neutral connection required. Sensors that rely on ground leakage current for operation shall not be provided.
 4. All sensors shall have an adjustable time delay off setting and a sensitivity adjustment.
 5. Ceiling mounted sensors shall operate be line voltage or low voltage with separate control unit. Control unit shall contain power supply and relays for switching loads.
 6. Units shall be furnished with area coverage to suit application. No allowance shall be given for providing sensors improperly sized for the square footage of the controlled area.
- D. Color: Device color shall be as selected by Architect, unless otherwise noted.
- E. Wallbox mounted single level control sensors:
1. Sensor shall provide minimum coverage of 900-square feet.
 2. Time delay adjustment from 30-seconds to 20-minutes. Set initial time-out setting at 4-minutes, unless otherwise specified. Set sensitivity adjustment at maximum.
 3. Load capacity of 0 to 1800watts at connected voltage.
 4. For use in small utility closets and similar areas where dual level switching is not indicated.
- F. Wallbox mounted dual level control sensors:
1. Sensor shall provide dual level switching capability and minimum coverage of 1000-square feet.
 2. Operation shall be manual (in two levels) "ON" and manual (in two levels) or automatic (full) "OFF".
 3. Time delay adjustment from 30-seconds to 20-minutes. Set initial time-out setting at 20-minutes, unless otherwise specified. Set sensitivity adjustment at maximum.
 4. Load capacity of 50 to 1000watts at connected voltages.
 5. Integral photocell. Provide with ambient light control adjustment.
 6. For use in offices and similar areas where dual level switching is indicated.
- G. Wallbox mounted combination sensor and dimmer:
1. Sensor shall provide 0-10volt dimming capability for LED loads.
 2. Sensor shall provide minimum coverage of 20-feet for clear line-of-sight applications.
 3. Infrared only or dual-technology sensor.
 4. Time delay adjustment from 3-minutes to 20-minutes. Set initial time-out setting at 15-minutes, unless otherwise specified. Set sensitivity adjustment at maximum.
 5. For use in private offices and similar areas where dimming is indicated.

H. Ceiling or wall mounted single-directional sensors:

1. Sensor shall provide minimum coverage of 900-square feet.
2. Operation shall be automatic "ON" and automatic "OFF". Provide with a manual override switch.
3. Time delay adjustment from 30-seconds to 20-minutes. Set initial time-out setting at 10-minutes. Set sensitivity adjustment at maximum.
4. Load capacity of 20amps per power or slave pack at connected voltage.
5. Power pack, if required, consisting of Class 2, 24volt output transformer and relay in single housing, capable of powering up 2 sensors and mounted inside standard 4-inch square box.
6. For use in small office, classroom, and similar areas.

I. Ceiling mounted omnidirectional sensors:

1. Sensor shall provide minimum omnidirectional coverage of 1000-square feet.
2. Operation shall be automatic "ON" and automatic "OFF". Provide with a manual override switch.
3. Time delay adjustment from 30-seconds to 20-minutes. Set initial time-out setting at 10-minutes. Set sensitivity adjustment at maximum.
4. Load capacity of 20amps per power or slave pack at connected voltage.
5. Power pack, if required, consisting of Class 2, 24volt output transformer and relay in single housing, capable of powering up to 2 sensors and mounted inside standard 4-inch square box.
6. For use in large storage rooms and similar areas.

2.04 COVERPLATES

A. General:

1. Provide all coverplates with rounded edges and corners, smooth and free of grooves, embossing or other embellishment.
2. Provide mounting screws to match the plate finish.
3. Provide gang type coverplates where two or more devices are installed at one location. Individual gangable coverplates are not acceptable.
4. Provide plates of one design, standard conventionaldesigner decora style, throughout the Project unless otherwise specified.

B. Color: Coverplate color shall be ivorywhiteblackgrayas specified by the Architect, unless otherwise noted.

C. Plastic coverplates:

1. Provide smooth, high impact, self-extinguishing thermoplastic coverplates and 0.100 inches thick with rounded edges and corners.
2. Provide openings to accommodate the devices indicated on the Drawings and in the Specifications.

D. Metal coverplates:

1. Provide smooth, type 430 stainless steel coverplates, 0.035" thick with rounded edges and corners.
2. Provide openings to accommodate the devices indicated on the Drawings and in the Specifications.
3. Provide removable plastic film to protect coverplates during installation. Remove film at time of final acceptance.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall thoroughly examine Project site conditions for acceptance of wiring device installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.02 PREPARATION

- A. Coordinate switch mounting location with Architectural details. Unless otherwise noted, locate switches on latch side of door.

3.03 INSTALLATION

- A. Install wiring devices in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.
- B. Install devices with the vertical centerline plumb and with all edges of the device flush against the adjacent wall surfaces.
- C. Mount switches at 42 inches to center above finished floor unless otherwise noted.
- D. Derate ganged dimmer switches as instructed by Manufacturer. Do not use common neutrals in dimmer circuits.
- E. Provide coverplates for all outlet boxes, switches, etc.
- F. Install blank coverplates on all outlet boxes in which no device is required or installed.
- G. Provide coverplates that completely cover wall opening and seat against wall.

3.04 OCCUPANCY/VACANCY WALLBOX SENSORS

- A. All occupancy/vacancy sensors shall have a sensitivity appropriate for the space. Contractor shall be responsible for testing the sensitivity of the sensor in the space and adjusting as needed.
- B. Where no direction is provided in a sequence of operation or by the owner set the occupancy sensor timeout to values as indicated in Part 2 above.
- C. Install wall mounted devices with the vertical centerline plumb and alleges of device flush against adjacent wall surfaces. Mount devices at 42-inches to center above finished floor unless otherwise noted.

3.05 FIELD QUALITY CONTROL

- A. Electrical testing:
 - 1. Test proper polarity of all receptacles.
 - 2. Test ground continuity of all wiring devices.
 - 3. Test ground fault interrupting device operation.
- B. Visual and mechanical inspection:
 - 1. Check proper operation of all switches.
 - 2. Check indicating lights on all SPD receptacles.
 - 3. Visually inspect and replace damaged or defective devices.

3.06 CLEANING

- A. Clean interior of all boxes from dirt and paint prior to installation of devices.
- B. Clean wiring devices and coverplates from dirt and paint over spray.

END OF SECTION 26 27 26

SECTION 26 28 16
OVERCURRENT PROTECTIVE DEVICES

PART 1 - GENERAL

1.01 SUMMARY

- A. Work included: Labor, materials, and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:
 - 1. Fuses.
 - 2. Molded case circuit breakers.
- B. Related Work: Consult all other Sections, determine the extent and character of related Work, and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1.02 REFERENCES

- A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:
 - 1. Underwriters Laboratories, Inc. (UL):
 - UL 248(1-16); Low-Voltage Fuses.
 - UL 489; Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures.
 - UL 512; Fuseholders.
 - 2. National Electrical Manufacturer Association (NEMA):
 - NEMA AB 1; Molded Case Circuit Breakers.

1.03 SUBMITTALS

- A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:
 - 1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
 - 2. Describe product operation, equipment and dimensions and indicate features of each component.
 - 3. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
 - 4. Provide factory certification of trip characteristics for each type and rating of circuit breaker.
 - 5. Provide current let-through and melting time information for each type and rating of fuses.

6. Confirmation in writing of compliance with Arc Energy Reduction per CEC Articles 240.67 and 240.87.
7. Submit Manufacturer's installation instructions.
8. Complete bill of material listing all components.
9. Warranty.

1.04 OPERATION AND MAINTENANCE MANUAL

- A. Supply operation and maintenance manuals in accordance with the requirements of Section 260010: Basic Electrical Requirements, to include the following:
 1. A detailed explanation of the operation of the system.
 2. Instructions for routine maintenance.
 3. Parts list and part numbers.
 4. Telephone numbers for authorized parts and service distributors.
 5. Final testing reports.

1.05 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.
- B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery: Overcurrent Protective Device components shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipment shall be replaced and returned to Manufacturer at no cost to Owner.
- B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic. Provide heat where required to prevent condensation.
- C. Handling: Handle in accordance with Manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.07 WARRANTY

- A. Units and components offered under this Section shall be covered by a **1**-year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

PART 2 - PRODUCTS**2.01 MANUFACTURERS**

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Fuses:

- a. Bussmann Division, Cooper Industries.
- b. Gould Shawmut Co.

2. Circuit breakers:

- a. Square D.
- b. ABB/ General Electric.
- c. Eaton.
- d. Siemens.

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.02 GENERAL

A. Overcurrent protective devices shall satisfy all CEC mandated selective coordination requirements (e.g. CEC Articles 517, 620, 645, 695, 700, 701, 708).

2.03 FUSES

A. General: All power fuses shall be time-delay, high interrupting (300K AIC), current limiting type, unless otherwise noted on the Drawings. All fuses shall be the product of a single Manufacturer and shall be selectively coordinated when applied in 2:1 ratio. Types of fuses shall be as follows:

1. 0 to 600amps: UL Class J, dual element, time delay type fuse with separate overload and short-circuit elements. The fuse shall hold 500% of rated current for a minimum of 10-seconds.

B. Control and instrument fuses shall be suitable for installing in blocks or fuseholders. Exact type and rating shall be as recommended by the Manufacturer of the equipment being protected.

2.04 MOLDED CASE CIRCUIT BREAKERS

- A. Branch and feeder circuit breakers shall be molded case, bolt on and trip indicating.
- B. Where stationary molded case circuit breakers are indicated on the Drawings to be current limiting type, they shall be current limiting as defined by UL 489 and shall not employ any fusible elements.
- C. Circuit breakers shall have interrupting capacity not less than that indicated on the Drawings or if not indicated, not less than 14,000 RMS symmetrical amps for 480volt systems and 10,000 RMS symmetrical amps for 208volt systems.

- D. Covers shall be sealed on non-interchangeable breakers and trip unit covers shall be sealed on interchangeable trip breakers to prevent tampering. Circuit breaker ratings shall be clearly visible after installation or engraved nameplates shall be provided stating the rating. All ferrous parts shall be plated to minimize corrosion.
- E. Circuit breakers shall be toggle, quick-make and quick-break operating mechanisms with trip-free feature to prevent contacts being held closed against overcurrent conditions in the circuit. Trip position of the breakers shall be clearly indicated by operating handles moving to a center position.
- F. Provide identified handle ties for single pole circuit breakers that share a neutral conductor.
- G. Multipole breakers shall have a single handle to open and close all contacts simultaneously in both manual operation and under automatic tripping. Interpole barriers shall be provided inside the breaker to prevent any phase-to-phase flashover. Each pole of the breaker shall have means for Arc extinguishing.
- H. All terminals shall be dual rated for aluminum or copper wire.
- I. Circuit breakers with frame ratings 100amps and smaller shall be ambient temperature compensated, thermal magnetic type unless otherwise noted. Breakers shall be of full size, 1" per pole type. Panels with more than one branch breaker larger than 100amps shall be installed in distribution type panels.
- J. Circuit breakers with frame ratings above 100amps through 400amps shall have solid state electronic trips with true RMS reading through the 13th harmonic with 1% accuracy, interchangeable trip via front accessible current plug, adjustable instantaneous and short time be rated as indicated on Drawings at the voltage indicated.
- K. Spaces in the boards shall be able to accept any combination of 1, 2 or 3-pole circuit breakers as indicated. Provide all necessary bus, device supports, and mounting hardware sized for frame, not trip rating.
- L. Series rated breakers are not acceptable unless specifically noted on the Drawings.
- M. Breaker shall be rated to operate in an ambient temperature of 40-degrees C and at 100% of their frame ampere rating on a continuous basis, if indicated on the drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall thoroughly examine Project site conditions for acceptance of overcurrent protective device installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.02 INSTALLATION

- A. Install overcurrent protective devices in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.

- B. Tighten electrical connectors and terminals; including screws and bolts, in accordance with equipment Manufacturers published torque-tightening values for equipment connectors. Where Manufacturers torque requirements are not indicated tighten connectors and terminals to comply with tightening torque specified in UL Standard 486A.
- C. Install overcurrent protective devices and accessories in accordance with Manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. All devices shall be installed in accordance with applicable CEC and NEMA standards for installation.
- D. Circuit breakers serving "Fire Alarm Control Panel(s)" shall be red in color.

3.03 ATTIC STOCK

- A. Provide 1 set of spare fuses for every set installed.

3.04 FIELD QUALITY CONTROL

- A. Independent testing: Contractor shall arrange and pay for the services of an independent Testing Agency to perform all quality control electrical testing, calibration and inspection required herein. Testing Agencies objectives shall be to:
 - 1. Assure overcurrent protective device installation conforms to specified requirements and operates within specified tolerances.
 - 2. Field test and inspect to ensure operation in accordance with Manufacturer's recommendations and Specifications.
 - 3. Prepare final test report including results, observations, failures, adjustments, and remedies.
 - 4. Verify ratings and settings and make final adjustments.
- B. At least three weeks prior to any testing, notify the Engineer so that arrangement can be made for witnessing test, if deemed necessary. All pretesting shall have been tested satisfactorily prior to the Engineer's witnessed test.
- C. The Contractor shall supply a suitable and stable source of electrical power to each test site. The Testing Agency shall specify the specific power requirements.
- D. Testing of overcurrent protective devices shall be done only after all devices are installed and prior to system being energized.
- E. Prefunctional testing:
 - 1. Provide Testing Agency with Contract Documents and Manufacturer instructions for installation and testing.
 - 2. Visual and mechanical inspection:
 - a. Inspect for physical damage, defects alignment and fit.
 - b. Perform mechanical operational tests in accordance with Manufacturer's instructions.

- c. Compare nameplate information and connections to Contract Documents.
- d. Check tightness of all control and power connections.
- e. Check that all covers, barriers, and doors are secure.

3. Electrical tests:

- a. Circuit continuity: All feeders shall be tested for continuity. All neutrals shall be tested for improper grounds.
- b. Test all circuit breakers with frame size 225amps and larger in each panelboard, distribution board, switchboard, etc. unless otherwise noted via primary current injection testing. Testing shall verify the following:

- 1) Determine that circuit breaker will trip under overcurrent conditions, with tripping time in conformance with NEMA AB 1 requirements.
- 2) Circuit breaker pickup and delay measurements are within the manufacturers published tolerances for long time, short time, instantaneous, and ground fault.
- 3) For circuit breakers rated or can be adjusted to 1200amps (or higher), confirm ZSI protection is acceptable or the maintenance mode switch is operational (enabled and disabled) with reduced pickup and delay measurements when enabled.

- F. Contractor shall replace at no costs to the Owner all devices which are found defective or do not operate within factory specified tolerances.
- G. Contractor shall submit the Testing Agency's final report for review prior to Project closeout and final acceptance by the Owner. Test report shall indicate test dates, devices tested, results, observation, deficiencies, and remedies. Test report shall be included in the operation and maintenance manuals.

3.05 ADJUSTING

- A. Adjust circuit breaker trip settings based on recommendations of Section 260060: Power System Study.
- B. Adjust circuit breaker trip settings for coordination with other overcurrent protective devices in system.
- C. Adjust circuit breaker trip settings for adequate protection from overcurrent and fault currents.

3.06 CLEANING

- A. Upon completion of Project prior to final acceptance the Contractor shall thoroughly clean overcurrent protective devices per Manufacturer's approved methods and materials. Remove paint splatters and other spots, dirt, and debris.

3.07 TRAINING

- A. Factory authorized service representative shall conduct a 4-hour training seminar for Owner's Representatives upon completion and acceptance of system. Instructions shall include safe operation, maintenance, and testing of equipment with both classroom training and hands-on instruction.
- B. Contractor shall schedule training with a minimum of 7-days advance notice.

END OF SECTION 26 28 16

SECTION 26 28 19
DISCONNECT SWITCHES

PART 1 - GENERAL

1.01 SUMMARY

- A. Work included: Labor, materials, and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:
 - 1. Disconnect Switches.
- B. Related Work: Consult all other Sections, determine the extent and character of related Work, and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1.02 REFERENCES

- A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated on specified:
 - 1. National Electrical Manufacturer Association (NEMA):
 - NEMA KS 1; Enclosed Switches.
 - 2. Underwriters Laboratories, Inc. (UL):
 - UL 512; Fuseholders.

1.03 SUBMITTALS

- A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:
 - 1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
 - 2. As a minimum the following characteristics shall be indicated:
 - a. NEMA types.
 - b. Current rating.
 - c. Number of poles.
 - d. Fuse provisions.
 - e. Enclosure dimensions.
 - f. Voltage.
 - g. Horsepower rating (if applicable).
 - h. Short circuit rating.

3. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
4. Submit Manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new, unused, and currently under production.
- B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.
 1. Square D.
 2. ABB/ General Electric.
 3. Eaton.
 4. Siemens.
- B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.02 DISCONNECT SWITCHES

- A. Description: Provide NEMA heavy-duty type switches with dead front construction and padlock provisions for up to three locks in the "OFF" position.
- B. Switch interior: Provide switch with switchblades that are fully visible in the "OFF" position when the door is open. Provide UL listed lugs for copper conductors, lugs to be front removable. Provide plated current carrying part.
- C. Switch mechanism: Provide switches with a quick-make, quick-break, position indicating, operating handle and mechanism and a dual cover interlock to prevent unauthorized opening of the switch door in the "ON" position or closing of the switch mechanism with the door open. Furnish an electrical interlock to de-energize control wiring when the disconnect switch is opened.
- D. Enclosures: Provide switches with hinged cover in NEMA 1 general purpose, sheet steel enclosure for dry locations and NEMA 3R weatherproof galvanized enclosures for exterior, damp, or wet locations, unless otherwise noted on the Drawings. Provide an enclosure treated with a rust-inhibiting phosphate primer and finished in gray baked enamel.
- E. Ratings: Provide switches that are horsepower rated for 240 VAC or 600volt AC as required for the circuit involved and that meet "I-SQUARED-T" requirements. Fusible switches to have provisions for the types of fuses specified in Section 262816: Overcurrent Protective Devices. UL listed short

circuit rating, when equipped with fuses to be 200,000amps RMS symmetrical. Furnish with provisions for RK-1 fuses for switches up to 600amps. 800amp switches and larger to have provisions for Class L fuses.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall thoroughly examine Project site conditions for acceptance of disconnects switch installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.02 PREPARATION

- A. Coordinate locations of switches and equipment in the field to provide code required clearances in front of switches and to ensure that switches are insight of the controller as described in CEC Article 430.

3.03 INSTALLATION

- A. Install disconnect switches where indicated on the Drawings.
- B. Install fuses in fusible disconnect switches.
- C. Include construction channel and mounting hardware as required to support disconnect switch.

3.04 IDENTIFICATION

- A. Provide engraved, machine screw retained type 'NP' nameplate on each disconnect switch. See Section 260553: Electrical Identification.

3.05 CLEANING

- A. Upon completion of Project prior to final acceptance the Contractor shall thoroughly clean both the interior and exterior of enclosure of all construction debris, scrap wire, paint splatters, dirt, etc.

END OF SECTION 26 28 19

SECTION 26 50 00
LIGHTING

PART 1 - GENERAL

1.01 SUMMARY

- A. Work included: Labor, materials, and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:
1. Interior luminaires (lighting fixtures.)
 2. Light-emitting diode (LED) assemblies.
 3. Drivers and transformers.
 4. Optical components; including diffusers, refractors, reflectors, and louvers.
 5. Unit battery equipment.
- B. Related Work: Consult all other Sections, determine the extent and character of related Work, and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.
1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
 2. Division 05: Metals; for fittings, brackets, backing supports, rods, etc. as required for support and bracing of luminaires.
 3. Division 09: Finishes; for ceilings, wall assemblies, acoustical treatment, and field painting of luminaires.

1.02 REFERENCES

- A. Comply with the latest edition of the following applicable Specifications and Standards except as otherwise indicated or specified:
1. American National Standards Institute (ANSI):

ANSI/IEC 60529;	American National Standard for Degrees of Protection Provided by Enclosures (IP Code)
C137.0	Lighting System Terms and Definitions.
C137.1	0-10V Dimming Interface for LED Drivers and Controls
 2. Underwriters Laboratories, Inc. (UL):

UL 66;	Fixture Wire.
UL 102.3;	Standard Method of Fire Test of Light Diffusers and Lenses.
UL 924;	Emergency Lighting and Power Equipment.

UL 1598; Luminaires.
UL 1598C; Light-Emitting Diode Retrofit Luminaire Conversion Kits.
UL 8750; Light Emitting Diode (LED) Equipment for Use in Lighting Products.
UL 8754; Holders, Bases, and Connectors for Solid-State (LED) Light Engines and
 Arrays.

3. National Electrical Manufacturers Associations (NEMA):

SSL-1; Electronic Drivers for LED Devices, Arrays or Systems.
77; Temporal Light Artifacts: Test Methods and Guidance for
 Acceptance Criteria.
LE-4; Recessed Luminaires, Ceiling Compatibility
100; Wire Insulation Colors for Lighting Systems

4. Illuminating Engineering Society of North America (IESNA):

TM-21; Projecting Long Term Lumen Maintenance of LED Light Sources.
TM-30; Method for Evaluating Light Source Color Rendition.
TM-30-Annex E Recommendations for Specifying Light Source Color Rendition
LM-79; Electrical and Photometric Measurements of Solid-State Lighting
 Products.
LM-80; Measuring Luminous Flux and Color Maintenance of LED Packages,
 Arrays and Modules.
LM-84; Measuring Luminous Flux and Color Maintenance of LED Lamps, Light
 Engines, and Luminaires.
LM-86; Measuring Luminous Flux and Color Maintenance of Remote Phosphor
 Components

5. Restriction of Hazardous Substances (RoHS):

RoHS 3; Directive 2015/863 - Cat 5. Lighting: lamps, luminaires, light bulbs.

1.03 SYSTEM DESCRIPTION

- A. Provide and install a fully functional and operating lighting system as indicated, complete with light engines, lamps, wiring, and securely attached to support system to meet all seismic code requirements.
- B. Where catalog number and narrative or pictorial descriptions are provided, the written description shall take precedence and prevail.

1.04 SUBSTITUTIONS

- A. Refer to Section 260010: Basic Electrical Requirements for specific Equipment requirements.
- B. Items specified under this Section and Luminaire Schedule are subject to the requirements, with the following qualifications:
 - 1. Items solely specified by Manufacturer name and catalog number, without qualifiers: Provide as specified – No Substitutions.
 - 2. Items specified by multiple Manufacturers, without qualifiers: Provide any listed manufacturer – No Substitutions.
 - 3. Items specified by sole or multiple Manufacturers, followed by “Or Approved Equal” or “Or Approved Equivalent”: Conform to substitution requirements outlined for Equipment.
 - 4. Items specified by sole or multiple Manufacturers, followed by “Or Equal” or “Or Equivalent”:
Products that meet the salient requirements are acceptable to provide.
 - a. Equivalency is at the sole judgement of the Architect and Engineer.
 - b. Should a submitted, unspecified product fail to meet the requirements of Equivalency, provide specified products at no additional cost to the Owner.
- C. Equivalency shall be determined by review of the following luminaire characteristics where applicable. Lack of pertinent data on any characteristic shall constitute justification for rejection of the submittal or substitution.
 - 1. Performance:
 - a. Distribution.
 - b. Utilization.
 - c. Luminance distribution (Average brightness / maximum brightness.)
 - d. Spacing to mounting height ratio.
 - e. Overall luminaire efficiency.
 - 2. Construction:
 - a. Engineering.
 - b. Workmanship.
 - c. Rigidity.
 - d. Permanence of materials and finishes.
 - 3. Installation Ease:
 - a. Captive parts and captive hardware.
 - b. Provision for leveling.
 - c. Through-wiring ease.

4. Maintenance:
 - a. Ease of relamping / replacement of LED array.
 - b. Ease of replacement of driver/ballast and lamp sockets.
 5. Appearance:
 - a. Architectural integration.
 - b. Light tightness.
 - c. Styling.
 - d. Conformance with design intent.
 - e. When requested, furnish a working sample complete with housing, trim, 8' cord and plug, and specified lamp.
- 1.05 SUBMITTALS
- A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:
 1. Complete bill of material listing (index) of all luminaires. Index shall be organized in the same sequence as the Luminaire Schedule (alphabetical.) Include in the index:
 - a. Type per the Luminaire Schedule.
 - b. Manufacturer.
 - c. Complete catalog number, including all accessories and appurtenances required for the installation.
 - d. Voltage.
 - e. Poles, arms, and brackets, if applicable.
 - f. Lamping, if applicable.
 2. Manufacturer's data sheets/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
 - a. Identify luminaire type on each sheet.
 - b. Clearly mark on each data sheet the specific item(s) being submitted. Obfuscate or otherwise delete options on data sheets that are not provided.
 3. Driver or transformer and/or lamp data sheets as applicable to submitted item.
 4. Manufacturer's installation instructions.
 5. Warranty.

6. U.L. labeling information.
7. Photometric Reports consisting of:
 - a. Independent Testing Laboratories, Inc. or equal, photometric test report for each luminaire listed on the Luminaire Schedule. Test reports shall be based on Illuminating Engineering Society published test procedures and shall contain candlepower distribution curves in five lateral planes for luminaires with asymmetric distributions and luminance data for vertical angles above 45 degrees from nadir.
 - b. Coefficient of utilization table.
 - c. Zonal lumen summary including overall luminaire efficiency.
8. Shop Drawings:
 - a. Where noted in the Luminaire Schedule, submit Shop Drawings from Manufacturer detailing modified or custom luminaires indicating dimensions, weights, methods of field assembly, components, features, accessories, methods of support, etc.

1.06 OPERATION AND MAINTENANCE MANUAL

- A. Supply operation and maintenance manuals in accordance with the requirements of Section 260010: Basic Electrical Requirements, to include the following:
 1. An updated index per 1.05-A.
 2. One complete set of final submittals of actual product installed, including product data and shop drawings.
 3. Instructions for routine maintenance.
 4. Pictorial parts list and parts number.
 5. Telephone numbers for authorized parts and service distributors.

1.07 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the units specified herein shall be new, unused, and currently under production.
- B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery: Luminaires shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipment shall be replaced and returned to Manufacturer at no cost to Owner.
- B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic. Provide heat where required to prevent condensation.

- C. Handling: Handle in accordance with Manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.09 WARRANTY

- A. Units and components offered under this Section shall be covered by a **1**-year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.
 - 1. Luminaires, Poles, and Exit Signs: as listed in the Luminaire Schedule.
 - 2. Light-Emitting Diode (LED) Arrays:
 - a. Cree.
 - b. Nichia.
 - c. Citizen.
 - d. Lumileds.
 - e. Samsung.
 - f. Lumenetix Araya.
 - g. Xicato.
 - h. Bridgelux.
 - i. LEDs provided by Luminaire Manufacturer listed in the Luminaire Schedule: meeting the technical and warranty requirements of this Section.
 - 3. LED replacement and integral-driver lamps:
 - a. General Electric.
 - b. Osram.
 - c. Cree.
 - d. Maxlite.
 - e. Green Creative.
 - f. Soraa.
 - 4. LED drivers (DC output):

- a. eldoLED.
- b. Lutron.
- c. Signify Advance.
- d. Osram.
- e. Q-Tran.
- f. Universal Lighting Technologies.
- g. Drivers provided by Luminaire Manufacturer listed in the Luminaire Schedule: meeting the technical and warranty requirements of this Section.

5. Unit battery equipment:

- a. Philips Bodine.
- b. Myers/Iota.
- c. Unit battery equipment provided by Luminaire Manufacturers listed in the Luminaire Schedule: meeting the technical and warranty requirements of this Section.

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.02 GENERAL

- A. Luminaires new and complete with mounting accessories, junction boxes, trims, and lamps.
- B. Luminaire assemblies U.L. listed appropriate to mounting conditions and application. All labels affixed to the luminaire shall be in a location not visible from normal viewing angles.
- C. Each luminaire family type (downlights, etc.) supplied by only one manufacturer.
- D. Recessed luminaires installed in fire rated ceilings and using a fire rated protective cover shall be thermally protected for this application and shall carry a fire rated listing.
- E. Luminaires shall be free of light leaks and shall be designed to provide sufficient ventilation of light engines, including ventilation holes where required.

2.03 LUMINAIRE CONSTRUCTION

- A. All sheet metal Work shall be free from tool marks and dents and shall have accurate angles bent as sharp as compatible with the gauges of the required metal. 20-gauge (0.7-mm or 0.027-inch) minimum.
 1. Finish: Baked white dry polyester powder, unless otherwise specified, with a minimum average reflectance of 85% on all exposed and light reflecting surfaces. Steel components shall be prepared for finishing with a 5-step zinc phosphating process prior to painting.
 2. Luminaire (including all painted component parts) shall be painted after fabrication unless specifically noted in the Luminaire Schedule.

- B. Extruded Aluminum Housings: One-piece housing of AA 6063 T5 extruded aluminum with 0.14 minimum thickness smooth and free of tooling lines in one uninterrupted section of 1-foot to 24-foot with the cross sectional dimensions as indicated in the Luminaire Schedule.
- C. Die-Cast Aluminum Housings:
 - 1. Single-piece casting to ensure water tightness.
 - 2. Low copper (<0.7% Cu) aluminum alloy.
 - 3. Minimum Class 4 Consumer Grade per NADCA Standards.
- D. All surfaces shall be cleaned and dressed to eliminate all exposed sharp edges or burrs.
- E. All intersections and joints shall be formed true and of adequate strength and structural rigidity to prevent any distortion after assembly.
- F. End Plates: Die cast end plates shall be mechanically attached without exposed fasteners. End caps shall be minimum 0.125" thick.
- G. All mitered corners or joints shall be accurately aligned with abutting intersecting members. Sheet metal Work shall be properly fabricated so that planes will not deform (i.e. become concave or convex) due to normal expected ambient and operating conditions.
- H. Ferrous mounting hardware and accessories shall be finished using either a galvanic or phosphate primer/baked enamel process to prevent corrosion and discoloration of adjacent materials.
- I. Fasteners shall be manufactured of galvanized steel.
- J. Adjustable Lamp Mechanisms: To have aiming stops which can be permanently set to position lamp vertically and rotationally.
- K. Recessed luminaires: Equip with through-wire junction box. Box, driver, and replaceable components shall be accessible from the ceiling opening of the luminaire.
- L. Finish:
 - 1. All exposed aluminum surfaces shall be treated with an acid wash and clear water rinse prior to painting. The luminaire shall then be electrostatically painted, or powder coated, and oven baked in the color indicated in the Luminaire Schedule.
 - 2. All exposed steel surfaces shall be treated with an acid wash and clear water rinse, then prime coated. The luminaire shall then be electrostatically painted, or powder coated, and oven baked in the color indicated in the Luminaire Schedule.
- M. Door Frames for lensed luminaires: White painted, flat aluminum with mitered corners.

2.04 SUSPENSION

- A. Suspension Devices, type as specified in the Luminaire Schedule:
 - 1. Aircraft Cable: Stainless steel type - 3/32" nominal diameter, stranded, with positive pressure, field adjustable clamp at luminaire connection.

2. Rigid Pendant: ½" nominal diameter or as specifically shown on drawings. Supplied by luminaire manufacturer when available as standard product. At luminaire end of stems, provide earthquake type swivel fitting to permit 45-degree swing in any direction away from vertical.
 3. Chain hangers: Length to suit mounting height if shown or as field conditions dictate. Use two heavy duty chains with "S" hooks at each suspension point. Length to suit mounting height as shown on Drawings.
- B. Suspension system must permit ±13-mm (1/2") minimum vertical adjustment after installation.
- C. Supports:
1. Provide internal safety cable from luminaire body to stud in outlet box.
 2. Carry luminaire weight to structure and provide horizontal bracing from suspension points to ceiling framing to prevent sideways shifting. Provide diagonal seismic restraint wires per code.
- D. Feed Point:
1. Flat-plate canopy to cover outlet box, with holes for support cable and power cord, concealed fasteners to permit splice inspection after installation.
 2. At the electrified connection provide straight cord feed.
 3. Power cord: white multi-conductor cord, parallel to support cable (aircraft cable); within pendant (rigid pendant); or flexible conduit (chain hanger).
 4. Where emergency feed is required, a separate feed point shall be provided.
- E. Non-feed Points:
1. 13-mm (½") O.D. polished chrome end sleeve, inside threaded ¼"-20, with 50-mm (2") diameter. Flat white plate to cover hole in ceiling. Top of cable with ball swaged on end, to fit inside sleeve.
 2. Contractor to provide support above ceiling as required.
- F. Suspension method shall allow adjustment to be made in hanging length to allow for variance in ceiling height.
- G. All exposed paintable suspension components shall have the same finish and color as the luminaire housing.

2.05 LAMPHOLDERS

- A. Of configuration and design to accept standard lamp bases.
- B. Wiring channels and lampholder mountings shall be rigid and accurately constructed.
- C. Integral-driver LED:
 1. Medium screw base: Unglazed porcelain body or thermoplastic (PET GF) with copper-alloy screw shell. 660watt, 250volt rated.

2. Bi-Pin base: Ceramic casing with mica cover plate, copper alloy contact surfaces. Pin distance designed for lamp provided.

2.06 LED ARRAYS

- A. Minimum lumen maintenance per LM-80 measurements and TM-21 calculations: L90 at 60,000 hours.
- B. Maximum burnout: B90 at 200,000-hours.
- C. Free of mercury and toxic materials; RoHS compliant.
- D. Linear LED boards: LED pitch shall be consistent throughout the luminaire and shall remain consistent from the end of one board to the start of the next. LED pitch shall be the same from the endcap of the luminaire to the last LED on the board as the LED pitch throughout the luminaire. Luminaire shall have a continuous luminous appearance – bright or dark spots are not acceptable.
- E. White LEDs:
 1. Interior
 - a. Correlated Color Temperature (CCT): 4000K
 - b. Minimum efficacy: 75 lumens per watt.
 - c. L70 lifetime: minimum 80,000-hours (extrapolated.)
 - d. Correlated Color Temperature (CCT); as specified in Luminaire Schedule. Maximum 3-step MacAdam ellipse variation throughout listed life (L70).
 - e. Color Rendering Index (CRI); minimum 80 Ra.
 - f. R9 value; minimum 30.
 - g. TM30 values; Rf >75, Rg >110.

2.07 LED DRIVERS:

- A. LED drivers shall be integral to luminaire housing or remotely located, when specified, within 15 feet of diode assembly.
 1. Luminaires shall be provided with the UL listed or equivalent driver and low voltage power supply as recommended by Manufacturer to insure proper and consistent lamp and luminaire performance. The number of LEDs per luminaire per power supply shall not be exceeded, and LEDs shall not be wired to a high capacity driver unless recommended by Manufacturer.
 2. Light Emitting Diode (LED) control gears shall operate with sustained variations of +/- 10% in voltage and frequency without damage to the driver and have a power factor not less than 90%. Regulations: +/-5% across the listed load range.
 3. Driver input current shall have Total Harmonic Distortion (THD) of less than 20%. The Driver shall have a Class A sound rating unless otherwise specified.
 4. Control gear shall be rated for 50-degree C ambient temperature.

5. All control gear shall facilitate smooth, flicker-free dimming from 100% to 10%, 1% or 0.1% as noted on the Luminaire Schedule.

2.08 LENSES

A. Acrylic:

1. Lenses shall be extruded or injection molded crystal clear 100% virgin acrylic (except as indicated otherwise). For lenses with male pattern of pyramids or cones, specified minimum thickness refers to distance from flat surface to base of pyramids (cones) or thickness of undisturbed material. For lenses with female pattern, specified minimum thickness refers to overall thickness of material.
2. Lenses shall fully eliminate lamp images when viewed from all directions within 45 to 90-degree angles from vertical, where the ratio of lamp spacing to the distance from lamp underside to top of lens does not exceed 1.50. Within the viewing angle from 0 to 45-degrees the ratio of maximum brightness (under a lamp) to minimum brightness (between lamps) shall not exceed 3 to 1.
3. Finishes (i.e. sandblasting, etching, polishing) shall be performed as described in the Luminaire Schedule.
4. Plastic electrical light diffusers must meet the requirements of Section 2-5209, CAC, Flame Spread Rating.
5. Prismatic Acrylic:
 - a. Extruded of clear virgin acrylic plastic, 0.125" minimum overall thickness, 0.100" nominal unpenetrated thickness, Pattern 12 with flat sided female prisms running at 45 degrees off panel axis unless otherwise specified in the luminaire schedule. Concave prisms are not acceptable.
6. Opal acrylic:
 - a. Extruded or injection molded of virgin acrylic plastic, 0.080" minimum overall thickness.

2.09 REFLECTOR CONES

- A. Reflector cones shall be manufactured of uniform gauge, not less than 0.032" thick, high purity aluminum, Alcoa 3002 alloy, free of spin marks or other defects or blemishes caused during manufacturing.
- B. The finish on the inner surface of the reflector shall be as described in the Luminaire Schedule and as produced by the Alzak process. The reflector shall have an anodic coating of not less than four mils thick. The reflector inner surface shall be free of water spotting and shall maintain a reflectivity ratio of not less than 83% on clear specular finishes. The reflectors shall have a low iridescence finish.
- C. All luminaires using Alzak reflector cones shall be supplied by the same manufacturer unless directed otherwise in Luminaire Schedule.

- D. Provide 45-degree lamp and lamp imaging cut-off unless otherwise specified in the Luminaire Schedule. Where upper reflector is separated from cone, cut-off shall be 45-degrees unless otherwise noted.
- E. Plastic materials shall not be used for reflector cones or aperture plate materials.
- F. Luminaires in which reflector cones are riveted or welded to the housing or where removal of the cone requires pressure to be applied to the finished surface of the reflector shall not be acceptable.
- G. Cone flange shall be formed as an integral part of the cone and shall have identical color and finish as the cone, except when specified otherwise in the Luminaire Schedule. The flange major surface shall be perpendicular to the cone axis. The width of the flange shall adequately cover the ceiling opening without light leaks. No luminaire parts (housing, mounting frame, etc.) shall be visible between the ceiling surface and the edge of the cone flange.
- H. Reflector cone retention devices shall not deform the cone in any manner.

2.10 UNIT BATTERY EQUIPMENT

A. LED Emergency Power Supplies

- 1. Standard Features:
 - a. Safety compliance to UL 924; CAN/CSAC22.2 No.141-10 and NFPA requirements for 90-minute egress
 - b. Open circuit / short circuit protection
 - c. Operating temperature: 32-degree F/0-degree C to 122-degree F/50-degree C
- 2. Test switch / charging indicator light
- 3. Emergency reaction time < 1-sec
- 4. Powder coat steel, stainless or galvan-nealed case
- 5. Field-replaceable NiCd battery pack (x2) with quick connect
- 6. Min. lead wire length: 6in UL 1452 solid / #18 AWG 1000volt / 90-degree C

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall thoroughly examine Project site conditions for acceptance of luminaire installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.02 PREPARATION

- A. Architectural Plans shall govern exact ceiling construction and mounting conditions for all luminaires. Locate as shown on the architectural elevations and reflected ceiling plan.
- B. Consult Architectural Drawings for details of ceiling construction, finish, and other applicable details.

- C. Contractor shall be responsible for coordination of luminaire mounting and compatibility with ceiling construction.
- D. Luminaires in areas where exposed or concealed pipe and ductwork prevents direct access to the structural ceiling shall be provided with appropriate support system to install luminaire below obstructions to avoid conflicts with same.

3.03 ARCHITECTURAL COORDINATION

- A. Where luminaires are mounted in architectural coves, soffits, valances, or cabinets and are given an overall length, the Contractor shall verify all lengths in the field prior to releasing order.
- B. Where luminaires are surface mounted or suspended to match the length of walls or other architectural elements, the Contractor shall verify all lengths in the field prior to releasing order.
- C. Mounting heights specified on drawings:
 - 1. Wall mounted luminaires: shall be to centerline of luminaire.
 - 2. Pendant mounted luminaires: shall be to bottom of luminaire unless specifically identified in the Luminaire Schedule or on drawings.

3.04 INSTALLATION

- A. Install luminaires in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.
- B. Contractor shall be responsible for all supports, hangers, and hardware necessary for a complete installation.
- C. Luminaires shall be plumb, level, square, in straight lines and without distortion.
- D. Remedy light leaks that may develop after installation of recessed or enclosed luminaires.
- E. Adjustable luminaires shall be installed with "dead" zone of rotation away from intended aiming point.

3.05 LUMINAIRE SUPPORTS

- A. Physical (gravity) supports:
 - 1. Recessed luminaires in wood framed ceilings shall be supported by 2" x 4" hangers fastened to adjacent ceiling joists.
 - 2. Recessed downlights in wood frame ceilings shall be supported with Manufacturers supplied bar hangers and shall be installed according to the Manufacturer's instructions.
 - 3. Surface mounted luminaires solely supported by recessed boxes in a gypsum board ceiling shall have a 1-1/8" steel bar screwed or welded to the back of the box. This steel bar must be long enough to span two ceiling support channels and shall be attached to the channels by twisting wire around the bar and the support channel. For luminaires weighing over 50-pounds, provide studs in recessed box.

4. Support surface mounted luminaires more than 18" wide at or near each corner or edge, in addition to support from outlet box.
 5. Support recessed downlights manufactured with built-in brackets by twisting wire around the bracket and two adjacent ceiling support channel runners on either side of the luminaire.
 6. Support outlet boxes as specified in Section 260533: Boxes. Provide all boxes with grounding pigtail.
 7. On concrete ceilings, use one of the following for supporting luminaires other than by outlet box:
 - a. Preset concrete inserts, provided inserts are completely covered by the luminaire after installation.
 - b. 1/4-20 threaded appropriate length wedge type anchor.
- B. Seismic supports:
1. Recessed luminaires in suspended ceilings shall be supported by connecting two support wires to the luminaire at diagonal opposite corners for luminaires weighing 56 pounds or less. Connect four wires, one at each corner for luminaires weighing more than 56 pounds.
 2. Surface mounted luminaires on suspended ceilings shall be attached to the main ceiling runner with at least two positive clamping devices and shall have an additional support wire attached to each clamping device and to the structure above.
 3. All suspended luminaires shall be able to swing 45-degrees from vertical in any direction without obstruction.
 - a. Furnish suspended rigid pendant luminaires with universal joint type hanger canopy and longitudinal sway adapter at each stem, to permit 45-degree swivel on 360-degree circle at canopy and 45-degree longitudinal movement at sway adapter.
 - b. Submit Drawings of hanger assembly for review prior to ordering.
 - c. If suspended luminaire is not free to swing 45-degrees in any direction, without obstructions, provide seismic restraint to prevent contact in conformance with California Uniform Building Code, Section 2330, Seismic Design.
 4. All recessed modular luminaires shall be furnished with earthquake clips where installed in tee bar ceiling.

3.06 ATTIC STOCK

- A. Spare Parts: Provide spare parts totaling 5 percent of the quantity specified, or two total, whichever is greater, of the following:
1. Luminaires:
 2. Lenses:
 3. LED Drivers:

4. LED Modules:

3.07 IDENTIFICATION SYSTEM

- A. All concealed junction box cover plates for the lighting branch circuit system shall be clearly marked with a permanent black ink felt pen identifying the branch circuit (both panel designation and circuit number) contained in the box.

3.08 FIELD QUALITY CONTROL

- A. Visual and mechanical inspection:
 - 1. Inspect for physical damage, defects, alignment and fit.
 - 2. Perform operational test of each luminaire after installed, circuited, and energized.
 - 3. Perform emergency operational test of all luminaires connected to emergency circuiting by simulating normal power source failure.
- B. Contractor shall replace at no cost to the Owner all equipment which is found defective or do not operate within factory specified tolerances.

3.09 CLEANING

- A. Clean luminaires prior to Project closeout in accordance with Manufacturer's recommended materials and methods.
- B. Remove all debris, fingerprints, and packaging remnants.

END OF SECTION 26 50 00

SECTION 27 00 00
COMMUNICATIONS BASIC REQUIREMENTS**PART 1 - GENERAL**

1.01 SUMMARY

- A. This Section specifies the common administration basic requirements and common methods for all low voltage systems installation work included under Division 27 and 28 and where those requirements differ from the requirements of this section, the more stringent shall govern.

1.02 STANDARDS, REGULATIONS, AND CODES REFERENCES

- A. The following Standards, Regulations and Codes apply to work specified in the Contract Documents.
1. Applicable State and Local Codes.
 2. California Building Code and California Electrical Code, Current Editions.
 3. BICSI TDMM (Telecommunications Distribution Methods Manual), 11th Edition 2006.
 4. ANSI/TIA/EIA-568-B.1. Commercial Building Telecommunications Cabling Standard,
 5. ANSI/TIA/EIA-568-B.1-2. Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements, Addendum 2, Grounding and Bonding Specifications for Screened Balanced Twisted-Pair Horizontal Cabling.
 6. ANSI/TIA/EIA-568-B.1-3. Commercial Building Telecommunications Cabling Standard.
 7. ANSI/TIA/EIA-568-B.1-4. Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements, Addendum 4, Recognition of Category 6 and Category Cat 6A and 50 nm Laser-Optimized 50/125 um Multimode Optical Fiber Cabling.
 8. ANSI/TIA/EIA-568-B.1-2. Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components.
 9. ANSI/TIA/EIA-568-B.2-1. Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components, Addendum 1, Transmission Performance Specifications for 4-Pair 100 Ohm Category 6 Cabling.
 10. ANSI/TIA/EIA-568-B.2-10 (draft 2.0). Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components, Addendum 10, Transmission Performance Specifications for 4-Pair 100 Ohm Augmented Category 6 Cabling.
 11. ANSI/TIA/EIA-568-B3.3 Optical Fiber Cabling Components Standard.
 12. TIA-569-B. Commercial Building Standard for Telecommunications Pathways and Spaces.
 13. ANSI/TIA/EIA-606-A. Administration Standard for Commercial Telecommunications Infrastructure.
 14. ANSI/TIA/EIA-607-A. Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.

15. TIA/EIA TSB-67 Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems.
16. TIA/EIA TSB-72 Centralized Optical Fiber Cabling Guidelines.

1.03 DEFINITIONS

- A. The following is a list of abbreviations generally used in Divisions 27 & 28:
 1. ADA - Americans with Disabilities Act
 2. AHJ - Authority Having Jurisdiction
 3. ANSI - American National Standards Institute
 4. APWA - American Public Works Association
 5. ASTM - American Society for Testing and Materials
 6. CBC - California Building Code
 7. CEC - California Electrical Code
 8. CFC - California Fire Code
 9. FCC - Federal Communications Commission
 10. HVAC - Heating, Ventilating and Air Conditioning
 11. IEC - International Electro-technical Commission
 12. IEEE - Institute of Electrical and Electronics Engineers.
 13. IETA - International Electrical Testing Association
 14. FM - FM Global
 15. NEMA - National Electrical Manufacturers Association
 16. NFPA - National Fire Protection Association
 17. OSHA - Occupational Safety and Health Administration
 18. UL - Underwriters Laboratories Inc.
- B. Provide: To furnish and install, complete and ready for the intended use.
- C. Furnish: Supply and deliver to the project site, ready for unpacking, assembly, and installation.
- D. Install: Includes unloading, unpacking, assembling, erecting, installing, applying, finishing, protecting, cleaning and similar operations at the project site to complete items of work furnished by others.
- E. Following is a list of commonly used terms in Division 27:
 1. Active Equipment: Electronic equipment used to develop various WAN and LAN services.
 2. Backbone: Collective term sometimes used to describe the campus and vertical distribution subsystem facilities and media interconnecting service entrances, communications rooms, and communications cabinets.
 3. Bonding: Permanent joining of metallic parts to form an electrically conductive path which will assure electrical continuity and the capacity to safely conduct currents likely to be imposed on it.
 4. Cabinet: Wall-mounted modular enclosure designed to house and protect electronic equipment.

5. Cable Tray: Vertical or horizontal open supports, usually made of aluminum or steel, that are fastened to a building ceiling or wall. Cables are laid in and fastened to the trays. A cable tray is not a raceway.
6. Campus: Grounds and buildings of a multi-building premises environment.
7. Channel: The end-to-end transmission path between two points at which application specific equipment is connected; may include one or more links, cross-connect jumper and/or patch cords, and work area station cords. Does not include connection to active equipment.
8. Cross-Connect: Equipment used to terminate and tie together communications circuits.
9. Cross-Connect Jumper: A cluster of twisted-pair conductors without connectors used to establish a circuit by linking two cross-connect termination points.
10. Fiber Optic Distribution Unit (FDU): Cabinet with terminating equipment used to develop fiber optic cross-connect facilities. Also known as LIU.
11. Grounding: a conducting connection to earth, or to some conducting body that serves in place of earth.
12. Hinged Cover Enclosure: Wall-mounted box with a hinged cover that is used to house and protect electrical devices.
13. Horizontal: Pathway facilities and media connecting the MDF or IDF to Telecommunications Outlets.
14. Intermediate Distribution Frame (IDF): Data networking equipment rack and/or location that serves an individual area, floor or building. Downstream from the MDF.
15. Jack: Receptacle used in conjunction with a plug to make electrical contact between communications circuits, e.g., eight-position/eight-contact modular jacks.
16. Link: A transmission path between two points, not including terminal equipment, work area cables, and equipment cables; one continuous section of conductors or fiber, including the connecting hardware at each end.
17. Local Area Network (LAN): Data transmission facility connecting several communicating devices, typically Ethernet and the network is limited to a single campus.
18. Main Distribution Frame (MDF): Initial (main) data network equipment rack and/or location. Only one MDF occurs per site and may serve many downstream IDFs.
19. Media: The type of cable (e.g., twisted-pair, coaxial, or fiber optic) used to provide signal transmission paths.
20. Minimum Point of Entry (MPOE): The location where the service provider hands off connection and responsibility for service to on premise customer owned equipment.
21. Modular plug: An eight-position, eight-conductor end-of-wire electrical connector used with Category rated cable.
22. Passive Equipment: Non-electronic hardware and apparatus, e.g., equipment racks, cable trays, electrical protection, wiring blocks, FDUs, etc.
23. Patch Cord: A length of copper or fiber cable with connectors on both ends used to join communications circuits at MDF/IDF and end stations.
24. Patch Panel: System of terminal blocks or connectors used with patch cords that facilitate the administration of cross-connect fields.

25. Pathway: Facility for the placement of communications cable. A pathway facility can be composed of several components including conduit, wireway, cable tray, surface raceway, underfloor systems, raised floor, ceiling support wires, etc.
26. Protectors: Electrical protection devices used to limit foreign voltages on metallic communications circuits.
27. Raceway: An enclosed channel designed expressly for holding wires or cables; may either be conductive metal or insulating plastic. The term includes conduit, tubing, wireway, underfloor raceway, and surface raceway; does not include cable tray.
28. Rack: An open or enclosed structure, typically made of aluminum or steel, used to mount equipment; usually referred to as an equipment rack. May be freestanding and floor mounted or a wall mounted cabinet. Industry standard 19" width spacing.
29. Wiring Block: Punch down terminating equipment used to develop twisted pair cross-connect facilities.

1.04 PRODUCT AVAILABILITY

- A. Products with long lead times are to be brought to the attention of the project manager.

1.05 PRODUCT SUBMITTALS

- A. See Division 01 Submittals for more requirements

1.06 SUBSTITUTION LIMITATIONS

- A. Equivalent product(s) may be considered for substitution for those products specified, however, the equivalent product(s) must be approved, and show demonstrated and documented equivalence to the product(s) specified. Documentation includes but is not limited to product samples, data sheets, and actual test data. The request for product substitution, and supporting documentation, must be submitted, in writing to the Project Manager/Designer.
- B. See Division 01 Substitutions for more requirements

1.07 QUALITY ASSURANCE

- A. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.
- B. Conform to the latest adopted version of the CBC with amendments by local AHJs.
- C. Obtain and pay for electrical permits, plan review, and inspections from local AHJs.
- D. Furnish products listed by UL or other testing firm acceptable to AHJ.

- E. Conform to requirements of the serving electric, telephone, broadband and cable television utilities.
- F. Contractor Qualifications:
 - 1. Minimum of five years' experience in the design, installation, testing, and maintenance of low-voltage systems.
 - 2. Maintain a local service facility which stocks spare devices and/or components for servicing systems.
 - 3. Have performed successful installation and maintenance of at least three projects similar in scope and size. Be able to provide project references for these three projects, including scope of Work, project type, owner/user contact name and telephone number.
 - 4. The contractor selected for this project must be certified by the manufacturer of the products and utilize these components for completion of work.
 - 5. Holds and maintains a valid California C-7 or C-10 State Contractors License and can exhibit validity upon request.
 - 6. A list of test equipment proposed for use in verifying the installed integrity of copper and fiber optic cable systems used.
 - 7. A technical resume of experience for the contractor's Project Manager and on-site installation supervisor who will be assigned to this project.
 - 8. A list of technical product training attended by the contractor's personnel that will install the specified manufacturer system.
 - 9. List of Sub-Contractor(s) who will assist the contractor in the performance of this work.

1.08 SEQUENCING AND SCHEDULING

- A. For the proper execution of the work, cooperate with other tradecrafts and contracts as needed.
- B. To avoid installation conflicts, thoroughly examine the complete set of Contract Documents. Resolve conflicts with Project Manager/Designer prior to installation.
- C. Prior to installation of communications cable to equipment requiring connections, examine the manufacturer's shop drawings, wiring diagrams, product data, and installation instructions. Verify that the electrical characteristics detailed in the Contract Documents are consistent with the electrical characteristics of the actual equipment being installed. When inconsistencies occur request clarification from Project Manager/Designer.

1.09 SHOP DRAWINGS

- A. Shop Drawings: When required by individual Specification Sections, provide shop drawings which include physical characteristics, electrical characteristics, device layout plans, point-

to-point wiring diagrams for all connections, and the like. Refer to individual Specification Sections for additional requirements for the shop drawings.

1.10 WARRANTY

- A. Provide an extended manufacturer's warranty on the Backbone and Horizontal Communications systems as specified in other sections of Division 27.

1.11 CLOSE OUT DOCUMENTS

- A. Final coordination drawings, with as-built information added, are to be submitted as record drawings at completion of project.
- B. Record Drawings:
 - 1. Show changes and deviations from the Construction Drawings. Include written Addendum and change order items.
 - 2. Show exact routes of pathway facilities and service entrance conduits.
 - 3. Show the exact location of racks, cabinets, mounting frames and the like.
- C. Operation and Maintenance Documentation: Provide copies of certificates of code authority acceptance, product data, guarantees, warranties, installation guides, maintenance guides and the like.
- D. Inspection and/or testing: Submit testing reports for testing that was performed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide like items from one manufacturer, such as wire/cable, jacks, modular plugs, patch panels, equipment connection cords, wall plates, and the like. See individual sections for detailed information.

2.02 MATERIALS

- A. Provide new electrical materials of the type and quality detailed, listed by UL, bearing their label wherever standards have been established. Indicated brand names and catalog numbers are used to establish standards of performance and quality.
- B. Provide material and equipment that is acceptable to AHJ as suitable for the use indicated. For example, provide plenum rated cable in ceilings that are utilized as air return plenums.
- C. Include special features, finishes, accessories, and other requirements as described in the Contract Documents regardless of the item's listed catalog number.
- D. Provide incidentals not specifically mentioned herein or noted on Drawings, but needed to complete the system, in a safe and satisfactory working condition.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Construction Documents:

1. Drawings are diagrammatic with symbols representing communications equipment, outlets, and wiring.
2. Electrical symbols indicating wiring and equipment shown in the Contract Documents are included in the Contract unless specifically noted otherwise.
3. Examine the entire set of Drawings to avoid conflicts with other systems. Determine exact route and installation of communications wiring and equipment with conditions of construction.

3.02 INSTALLATION

- A. Install communications equipment completely as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of the communications equipment, examine the instructions thoroughly. When requirements of the installation instructions conflict with the Contract Documents, request clarification from Project Manager/Designer prior to proceeding with the installation.
- B. Do not install communications equipment in obvious passages, doorways, scuttles, or crawl spaces which would impede or block the passage's intended usage.
- C. Do not install communications equipment in locations where it would obviously be subject to damage during normal usage.

3.03 FIELD QUALITY CONTROL

- A. Tests: Conduct tests of equipment and systems to demonstrate compliance with requirements specified in Division 27 & 28. Refer to individual Specification Sections for required tests. Document tests and include in Closeout Documents.

3.04 CLEANING

- A. Remove dirt and debris caused by the execution of the communications work.
- B. Leave the entire communications system installed under this Contract in a clean, dust-free, and proper working order.

- C. Vacuum clean interiors of new and modified electrical signal and communication equipment enclosures.

END OF SECTION

SECTION 27 05 00
COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. This section specifies the basic materials and methods for all low voltage pathways installation work included under Division 27 and 28 and where those requirements differ from the requirements of this section, the more stringent shall govern.
- B. This section adds refinements to Division 26 that apply to Communications and extra-low-voltage systems.

1.02 SCOPE

- A. Materials and/or methods for the following.
 - 1. Communication services
 - 2. Grounding
 - 3. Fasteners
 - 4. Hangers and supports
 - 5. Conduits/Backboxes/Raceways
 - 6. Underground
 - 7. Sleeves and penetrations

1.03 SUBMITTALS

- A. Submittals shall be done in accordance with District submittal procedures, see Division 01 Submittals for requirements.

1.04 RELATED REQUIREMENTS

- A. Division 07 – Thermal and Moisture Protection
- B. Division 26 – Electrical
- C. 27 00 00 – Communications Basic Requirements

1.05 REFERENCES

- A. ANSI American Nation Standards Institute

- B. NFPA 70 – National Electrical Code
- C. UL Underwriters Laboratory
- D. California Building Code (CBC)
- E. California Electrical Code (CEC)

1.06 WARRANTY

- A. Refer to Division 01 -- Warranties

PART 2 – PRODUCTS

2.01 All products used on this project shall bear the label and be approved by Underwriters Laboratories unless otherwise approved in writing by District.

2.02 FASTENERS

A. Mounting hardware and anchors recommended by the manufacturer of any material that shall be mounted to the building or structure.

1. Sheet rock / drywall / wall board: Easy Anchor, toggle bolt, other spread type anchor with load distribution, or approved equal.
2. Concrete / cinder block / solid masonry: Expanding compression type lag, expanding compression type bolt, expanding compression type, all-thread with nuts, or approved equal.
3. Tile / Stucco / hollow masonry: Toggle bolts or approved equal.
4. Wood: Lag screws, wood screws, or approved equal.
5. Metal: Beam clamps, sheet metal screws, self-drilling screws or approved equal.

2.03 HANGERS AND SUPPORT

A. D-RINGS

1. Commercial grade

B. J-HOOKS

1. Commercial grade

2.04 SURFACE RACEWAY

A. The District has standardized on Wiremold 800, 2300, 5400 and 5500 series for non-metallic surface raceway.

2.05 CONDUITS AND ACCESSORIES

A. CONDUITS

1. See Division 26 for requirements.
2. Conduit for Fire Alarm applications shall be red in color (non-accessible areas are excluded).

3. All new conduits shall be sized accordingly to achieve a 40% maximum fill ratio with initial cables installed.
4. Underground conduits shall be Schedule 40 PVC.

B. INNERDUCT

1. Orange corrugated HDPE (High Density Polyethylene) Innerduct shall be used for fiber optic cable protection in interior locations.
2. Fabric multi-cell innerduct is approved for underground conduits 2" and larger.

C. FITTINGS:

1. See Division 26 for requirements.
2. Conduit bodies and any sharp bend fittings are strictly prohibited for communication Cat6A and fiber optic cables. Appropriate conduit sweeps are required.

D. PULL LINE

1. Minimum 1/8" diameter, or larger braided line of polypropylene or continuous fiber polyolefin. The minimum breaking strength of 1/8 in. line is 200 lbs.

2.06 BACKBOXES, JUNCTION BOXES AND FLOOR BOXES

- A. Galvanized one-piece or welded pressed steel type. Boxes for fixtures shall not be less than 4" square and shall be equipped with fixture stud. Boxes shall be at least 2-1/8" deep, 4" square for 1 or 2 gang devices, with device rings. Boxes mounted in wall or ceiling finished with 5/8" gypsum board shall be furnished with 5/8" deep device rings. Provide blank cover for all boxes without fixture or device.
- B. Junction boxes, larger than 8", located indoors shall be hinged, NEMA-1 rated.
- C. Junction boxes, larger than 8", located outdoors, or in wet or damp locations shall be hinged, NEMA-3R.
- D. Provide and install tamper-proof screws for all exterior boxes.
- E. Junction boxes used for Fire Alarm systems are to be red in color with red colored cover plates.

2.07 GROUND BOXES

- A. See Division 26 and below for requirements.
- B. Approved manufactures are Jensen, Christy or approved equal.
- C. All ground boxes shall have metal traffic-rated lids with permanent factory markings of COMM or COMMUNICATIONS.
- D. Minimum size is 17" x 30"
- E. For AT&T service feeds the requirement is for 30"x48" Intercept Pullboxes. Jensen SKU 100020251/Mod # K304836AT was referenced by AT&T.
- F. For Comcast - Christy B2436 at service tie in and B1730 as an inline pullboxes are acceptable.

2.08 PENETRATION SEALING

- A. Firestopping: Provide UL Listed Firestopping materials for all penetrations through rated assemblies (walls / floors). See Division 07 for more information.
- B. Draft stopping: Foam sealant for use around conduit penetrations (in non-rated assemblies) to prevent passage of air, smoke, and/or toxic gas. See Division 07 for more information.
- C. Weatherproofing: Weatherproof sealant for use around conduit penetrations in exterior walls to prevent the intrusion of water. See Division 07 for more information.

2.09 GROUNDING BUS BAR

- A. Copper bus bar 2"x10"x1/4" minimum size with stand-off brackets and insulators, pre-drilled and threaded mounting holes (hole qty. 12 or greater) for equipment grounding lug attachment.

PART 3 - EXECUTION

3.01 COMMUNICATION SERVICES

- A. Install inground boxes, conduits, and terminal cabinets per service provider requirements.

3.02 GROUNDING

- A. Ground fittings shall be UL approved for each application and installed and/or connected to system in accordance with current CEC Code requirements.
- B. See Division 26 for additional requirements.
- C. Install grounding bus bar per manufacturer's instructions and to be in each MDF and IDF.

3.03 HANGERS AND SUPPORTS

- A. Install hangers and supports per manufacturer's written instructions.
- B. Hanger spacing shall be 48" or less and within 12" of sleeves and/or junction/back boxes.

3.04 LOW VOLTAGE PATHWAY/RACEWAYS

- A. EMT conduit may be used at following locations (see Division 26 for exact requirements):
 - 1. In dry locations in furred spaces.
 - 2. In partitions other than concrete or solid masonry.
 - 3. In protected exterior locations not exposed to direct weather.
- B. Rigid steel conduit and fittings shall be used for vertical risers and on top of all roofs, overhangs, walkways, canopies, or any other location exposed to direct weather. See Division 26 for exact requirements.
- C. Furnish and install pull lines in all unused (empty) conduits or raceways. All pull lines shall be permanently tagged with identification at both ends.
- D. Install exposed conduit neatly, parallel to or at right angles to structural members. Maintain a minimum of 12 inches of clearance from steam or hot water pipes. All installed strut channel supports should allow for future conduit attachments. The width of strut channel to match the width of the closest attached junction box. See design document details for attachment requirements.
- E. Supports: Support conduit with two-hole straps or strut channel where shown in design documents and/or specified. Coordinate supports with architectural details. Secure to wood

- structure by means of bolts or lag screws, to metal by means of shallow self-tapping screws, to concrete by means of insert or expansion bolts, to brickwork by means of expansion bolts, and to hollow masonry or stucco by means of toggle bolts.
- F. Spacing for all EMT and rigid steel conduit supports shall be as follows unless otherwise specified in design documents details:
1. Surface conduit spacing and supports and unless otherwise specified or shown on drawing details:
 - a. EMT – Size 3/4" to 2" – 4' maximum spacing (3 each supports per 10' conduit length) and 12" from each end of conduit at coupling, connector or 90-degree bend.
 - b. Rigid steel – Size 3/4" to 2" – 4' maximum spacing (3 each supports per 10' conduit length) and 12" from each end of conduit at coupling, connector or 90-degree bend.
- G. If conduit is designated for low voltage use, no more than a total of 360 degrees of conduit bend radius will be allowed between pull boxes.
- H. All junction boxes shall be connected to conduits using appropriate connecting hardware (i.e. box connectors).
- I. Clean, prep and paint with white primer all exposed conduit, junction boxes, channel strut, fittings, and accessories.
- J. Before pulling any conductors into an underground PVC conduit (new or existing), the conduit shall be first be proofed by pulling through a mandrel of a diameter ¼ in. smaller than the conduit inside dia., followed by a swab of the same diameter as the conduit inside diameter.
- K. Non-metallic raceway to be installed with mechanical fasteners only, do not remove adhesive tape backing.
- L. Capping
1. Cap conduits during construction with manufactured seals. Swab out conduits before installing wires.
 2. Cap all empty conduits below grade and in pull boxes with manufacturer's caps to prevent entrance of debris, attach pull string to cap.

M. Underground Conduit

1. Service provider conduits shall be:
 - a. AT&T - 1-4" (fiber only) or 2-4" (fiber and copper)
 - b. Comcast - 1-2"
2. #10 tracer wire or tracer tape is required for all underground Division 27 PVC conduits.

3.05 J-BOXES

- A. Screws shall be used to attach boxes, and must be accurately placed for finish, independently and securely supported by adequate wood backing or by manufactured adjustable channel type heavy-duty box hangers.
 1. Boxes shall be attached to metal studs with metal box hangers.
 2. Boxes installed in masonry tile or concrete block construction shall be secured with auxiliary plates, bars or clips and be grouted in place.
- B. Locate outlets at the following heights unless otherwise noted on Drawings, Specifications, current CBC or as required to meet ADA handicap requirements.
 1. Data Outlets: Same height as electrical outlets
 2. Telephone Wall Outlets: Above counter/backsplash height or at electrical switch height.
- C. Boxes shall be placed within 18" of electrical outlets.
- D. For sound control, separate outlets on opposite sides of walls 16" minimum. Where outlets are less than 16" or in sound rated walls, seal airtight with fire rated sheet putty pads. Fill gap between junction box and wall with acoustical sealant all around perimeter of junction box. Fill conduits larger than 1 1/4" with fire rated putty.
- E. Installation of conduit and outlet boxes in fire-resistive walls, floors, floor-ceiling or roof-ceiling assemblies shall comply with Title 24, Part 2, Section 713.

3.06 GROUND BOXES

- A. To be installed per Division 26 requirements.
- B. Provisions to be made for supporting cables from the box sides (i.e., j-hooks, d-rings)

- C. Install a 30" x 48" for service provider AT&T at service tie-in location and/or a 24" x 36" for service provider Comcast at service tie-in location. If less than 360-degrees of bends and less than 200 feet it is acceptable to stub in to the MPOE directly. If greater for 360-degree for bends or 200 feet for length then additional in-line ground boxes are required (30" x 48" for AT&T, 17" x 30" for Comcast). See section Part 2 – Products for more information.

3.07 SLEEVES AND CONDUIT PENETRATIONS

- A. Where conduit passes through walls, ceilings, or floors with connection points to junction boxes or raceways mounted to the same wall as the penetration provide a threaded conduit and secured in place with locking rings on both sides. Bend radius requirements shall be maintained where penetrations are made through the back of raceways; junction boxes with adequate depth shall be installed to comply with this requirement.
- B. Where conduit passes through walls, ceilings, or floors with connection points to junction boxes or raceways not mounted to the same wall as the penetration, provide EMT conduit and secured in place with strut channel. Box connectors shall always be used to connect EMT to junction boxes and raceways.

C. FIRE STOPPING

- 1. Seal all conduit penetrations through fire rated walls and floors fire and smoke tight in conformance with current CBC and current CEC. See Division 07 for more information.

D. DRAFT STOPPING

- 1. All non-fire rated walls must be draft stopped and sealed. Submit method to be used for approval by inspector and/or project manager. Mineral wool is one product that may be used. See Division 07 for more information.

E. WEATHER SEALING

- 1. All exterior penetrations shall be sealed watertight. The contractor shall use silicon rubber caulk or other approved methods and materials. Submit method and material with inspector and/or project manager. See Division 07 for more information.

3.08 CLEANING

- A. Clean all work prior to concealing, painting, and acceptance. Performed in stages if directed.

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- B. Clean and repair soiled or damaged painted exposed work and match adjoining work before final acceptance.
- C. Remove debris from inside and outside of equipment and enclosures.

3.09 FINAL DOCUMENT SUBMITTALS

- A. See 27 00 00 for more information.

END OF SECTION

SECTION 27 10 00
STRUCTURED CABLING

PART 1 – GENERAL

1.01 SUMMARY

- A. This section specifies equipment, accessories, materials, installation, configuration, and testing requirements for a complete and operable Structured Cabling communications system. The system shall provide highly reliable and high-performance data communication from main distribution frame (MDF) through each intermediate distribution frame (IDF) to end points requiring fiber optics and/or copper cabling and associated equipment.
- B. This section condenses sections 27 11 00 – Communications Equipment Room Fittings, 27 13 00 – Communications Backbone Cabling, 27 15 00 – Communications Horizontal Cabling and 27 16 00 – Communications Connecting Cords into one comprehensive section.

1.02 SCOPE

- A. The work will include but not be limited to the following objectives:
 - 1. Contractor shall furnish and install all required components and accessories as outlined in the design documents for a complete and operable turn-key system.
 - 2. Quality workmanship is a high priority for the District and the Contractor shall be held to a high-level of professional workmanship. Contractors unfamiliar with the District's standards shall familiarize themselves with the standards and requirements prior to beginning work
 - 3. The Contractor shall furnish and install all required fire-treated $\frac{3}{4}$ " (three quarter inch) plywood for the MDF and all IDF locations.
 - 4. The Contractor shall furnish and install a ground bus bar at the MDF and IDF rooms.
 - 5. The Contractor shall furnish and install all required racks and cabinets.
 - 6. The Contractor shall furnish, install, and configure uninterruptable power supply(ies) (UPS) for the MDF and/or IDF racks.
 - 7. The Contractor shall furnish and install all newly required conduit/raceway.
 - 8. The Contractor shall furnish and install all wire/cable (copper/fiber optic) as required.
 - 9. The Contractor shall terminate all strands of fiber at each fiber enclosure.
 - 10. The Contractor shall furnish and install termination all end-point equipment (patch panels, jacks, wallplates, enclosures, etc.).
 - 11. The Contractor shall furnish and install all patch cords (copper/fiber).
 - 12. The Contractor shall test and certify (for warranty) the installed cable plant.

1.03 RELATED REQUIREMENTS

- A. Section 01 – General Requirements
- B. Section 27 00 00 – Communications
- C. Section 27 05 00 – Common Work Results for Communication Systems.

1.04 INDUSTRY GUIDELINES AND STANDARDS

- A. California Electrical Code (CEC) – Current adopted version
- B. California Building Code (CBC) – Current adopted version.
- C. ANSI/TIA-568.0-D – Generic Communications Cabling for Customer Premises.
- D. ANSI/TIA-568.1-D – Commercial Building Communications Cabling Standard Part 1: General Requirements.
- E. ANSI/TIA 568-C.2 – Balanced Twisted-Pair Telecommunications Cabling and Components Standards
- F. ANSI/TIA 568.3-D – Optical Fiber Cabling Components Standard
- G. ANSI/TIA-569-D – Commercial Building Standard for Telecommunications Pathways and Spaces.
- J. ANSI/TIA-606-B – Administration Standard for the Commercial Telecommunications Infrastructure.
- K. ANSI/JSTD-607-C – Commercial Building Bonding and Grounding (Earthing) Requirements for Telecommunications.

1.05 QUALIFICATIONS

- A. The contractor shall possess a California C7 or C10 license.
- B. The Contractor or Subcontractor shall have 5 years' documented experience.
- C. The Contractor and installers shall be certified by the product manufacturer.

1.06 SYSTEM REQUIREMENTS

- A. Any new installations or existing system modifications shall seamlessly integrate into the site's existing data cable plan system.

1.07 CONTRACTOR "SHOP DRAWINGS" DESIGN REQUIREMENTS

- A. See section 27 00 00 for requirements.

1.08 SUBMITTALS

- A. See section 27 00 00 for requirements.

1.09 WARRANTY

- A. Refer to Division 01 Warranty section.
- B. See section 27 00 00 for additional requirements.
- C. 25-year manufacturer's warranty/certification required for all copper and fiber cable plant installations.

1.10 CLOSEOUT DOCUMENTS

- A. See section 27 00 00 for requirements.

PART 2 – PRODUCTS

2.01 GENERAL

- A. See Appendix A at the end of this document for pre-approved materials.
- B. All products shall be new, unused and without blemishes and shall be of manufacturer's current and standard production.
- C. Contractor shall confirm all equipment part numbers with the Project Manager or District prior to ordering equipment and updating submittals as required.
- D. Drawings and Specifications indicate major system components, and may not show every component, connector, module, or accessory that may be required to support the operation specified. The Contractor shall provide all components needed for complete and satisfactory installation and operation.
- E. Install mounting hardware and anchors as recommended by the Manufacturer of the equipment that requires mounting to the building or structure and adhere to all code requirements. See section 27 05 00 for requirements.
- F. Product Availability
 - 1. Contractor, prior to submitting a proposal, shall determine product availability and delivery time, and shall include such considerations into his proposed Contract Time.

2.02 MANUFACTURERS AND PRODUCTS

- A. See Appendix A at the end of this document for pre-approved materials.
- B. Substitutions require proof of equivalence and approval by District and/or its representative.
- C. For maintenance and consistency with the existing installed base, data connectivity components (copper and fiber) shall be Ortronics.

2.03 COPPER/FIBER OPTIC CABLES AND COMPONENTS

- A. All copper cables and components shall be Cat6A rated.
 - 1. Cable to be reduced diameter. White jacket for default cable, Blue jacket for CCTV and Access Control only.
 - 2. Jacks to be keystone style.
- B. Patch cords system/color:

1. Data = Blue color
 2. AP = Green color
 3. CCTV = Blue color
 4. Clock/Intercom = Yellow color
 5. Access Control = Black color
 6. Fire Alarm/Intrusion Alarm = Red color
- C. Data jacks system/color:
1. Data/default = White color
 2. AP = Green color
 3. CCTV = Blue color
 4. Clock/Intercom = Yellow color
 5. Access Control = Black color
 6. Fire Alarm/Intrusion Alarm = Red color
- D. All fiber optic cables and components shall be single single-mode OS2 rated.
- E. Fiber optic cable terminations shall be LC-Duplex style.

PART 3 – EXECUTION

3.01 ACCEPTABLE INSTALLERS

- A. The components making up the structure cabling system shall only be installed by Contractors who are qualified to install, service and maintain the system.
- B. Cable terminations (copper or fiber) shall be installed by manufacturer certified technicians.
- C. The Contractor (or subcontractor listed at time of bid) must have at least five (5) years' experience before the Bid Opening Date.

3.02 EXAMINATION

- A. The Contractor shall be required to visit the installation site(s) prior to job bidding. The Contractor acknowledges that the failure to visit the site(s) will not relieve the Contractor of the responsibility for accurate bidding and performance of the Work.
- B. The Contractor shall report any discrepancies between the Specifications, Drawings, and Site Examination prior to the Bid Opening Date.

3.03 PREPARATION

- A. The Contractor shall order all required parts and equipment upon receipt of approved product submittals.
- B. The Contractor shall verify the availability of power where required.

3.04 SHOP DRAWINGS

- A. The Contractor shall create "Shop Drawings" per section 27 00 00 for this section.
- B. Submit drawings for review and approval by the Project Manager and/or Designer.

3.05 INSTALLATION

- A. ENTRANCE FACILITIES
 - 1. Contact telecommunications service provider and arrange for installation of demarcation point, protected entrance terminals, and housing when so directed by service provider.
 - 2. Install underground or aerial pathways complying with recommendations in TIA/EIA-569-A, "Entrance Facilities" Article.

B. UNDERGROUND ENTRANCE PATHWAY

1. Install underground entrance pathway complying with Division 26.

C. EQUIPMENT RACKS, CABINETS, ENCLOSURES AND ACCESSORIES

1. Backboards:
 - a. Shall be installed behind the rack or cabinet if the cabinet is not able to be directly attached to two vertical wall studs.
 - b. Backboards shall be made of fire retardant or treated materials, squarely cut, and with sanded edges
 - c. Backboards shall be a minimum ¾" thick and large enough to secure it to two vertical wall studs.
 - d. The "FIRE RATED" stamp shall be visible.
 - e. Backboards shall be fastened with ¼" lag bolt and washer, non-recessed, with maximum spacing of 18" into 2 vertical studs. 1-1/2" embedment.
 - f. Visible portions (outside of cabinet) of Backboards shall be painted black.
2. All data & voice communications racks and cabinets shall be anchored in accordance with manufacturer's specifications, project specifications and/or drawn details, to walls and floors and grounded to building ground grid (not to water pipes etc.).
3. Securely mount equipment cabinet and racks to the building structure. A proper quantity of support fasteners shall be utilized. Typically lag bolts for wood installations, wedge anchors for concrete flooring. Submit data sheets for mounting fasteners for approval before installation. Mount equipment per DSA approved drawings/details.
4. Equipment cabinet mounted on or against walls will have 3-foot clearance in front of deepest component and accessible to rear for service.
5. MDF and all IDF's shall have at least one dedicated 120VAC 20-amp quad-receptacle each.
6. Patch Panels: Mount patch panels into the cabinet/rack. Match manufacturer of existing install or if new construction, see Appendix A.
7. Cable Management: Secure the cable bundle(s) to the rack strain relief and cable management behind the patch panels and cross connect block panels. Install horizontal cable management panels and brackets for routing and management of patch cables. Maintain TIA/EIA and BICSI standards on bundling, supporting and bend radius.

8. Surge Protected Outlet Strips: Required in MDF rack. Mount surge protected outlet strips per Manufacturer's directions. Refer to details on the Drawings for mounting location.
9. Furnish and install UPS in bottom of MDF/IDF rack.

D. MDF/IDF GROUNDING

1. Refer to Section 27 05 00 Grounding for more requirements.
2. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 6 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
3. Bond metallic equipment (including ladder rack) to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.06 WORKMANSHIP

- A. Quality workmanship is a high priority for the District and the Contractor shall be held to a high-level of professional workmanship.
- B. The District' Project or Construction Manager will have the authority to reject Work which does not conform to the Drawings and Specifications.
- C. Comply with highest industry standards, except when specified requirements indicate more rigid standards or more precise workmanship.
- D. Perform Work with persons experienced and qualified to produce workmanship specified.
- E. Maintain quality control over suppliers and Subcontractors.

3.07 WIRE/CABLE (COPPER/FIBER OPTIC)

- A. Design, layout, size, and plan new cable runs as required.
- B. All wire and cable passing through metalwork shall be sleeved by an approved grommet or bushing.
- C. Conduit/raceway fill shall not exceed 40 percent of interior cross-sectional area.
- D. Neatly dress and tie (Velcro) all cabling.

- E. UTP cabling shall conform to a 6-foot separation requirement from the main power panel, transformers, switchgear and/or starter motors adjacent to the MDF, IDF and termination locations.
- F. Fiber optic cable shall be installed from the MDF to each IDF.
- G. Orange corrugated HDPE (High Density Polyethylene) Innerduct shall be used for fiber optic cable protection in all interior locations.
- H. Spicing of fiber optic cable shall be done with fusion splices.
- I. When required copper feeders (minimum 4-pair) are to be installed from the MDF to each IDF.
- J. Maintain proper bend radius for all cable installations.
- K. Do not exceed cable manufacturer's instructions for installation pull load. Any cable damaged by excessive pull force shall be replaced by the installing contractor.
- L. Modular plug terminated link (MPTL) style wiring is acceptable for CCTV with modified single connector permanent link testing.

3.08 LABELING

- A. MDF/IDF - Identification number in large font on front of cabinet.
- B. MDF, Fiber Optic LIU Ports – IDF number and room number
- C. MDF/IDF, Copper Patch Panel – Panels labeled P1, P2, P3, etc., ports labeled with room number.
- D. LAN Outlet – IDF number, patch panel number, patch panel port number.
- E. Cables to be labeled both ends with unique identifiers and from/to location identifiers. For Copper Cat cable IDF number, patch panel number, patch panel port number.
- F. T-bar ceilings shall have device labels attached next to the device for ceiling mounted equipment and at the tile for above ceiling equipment with device type and device ID points/IP address.

3.09 CONDUIT AND RACEWAY INSTALLATION

- A. See Division 26 and section 27 05 00 for requirements.

- B. Conduit bodies and any other sharp bend fittings are strictly prohibited for communications cabling (copper/fiber).
- C. Install proper radius conduit sweeps where required.

3.10 FIELD QUALITY CONTROL AND TESTING

- A. Upon reaching substantial completion, perform a complete test and inspection of the system. If found to be installed and operating properly, notify District of your readiness to perform the formal Test & Inspection of the complete system.
- B. Submit the Record Drawings (as-builts) to District for review prior to inspection.
- C. During the formal Test & Inspection (Commissioning) of the system, the Contractor shall have personnel available with tools and equipment to inspect wiring, devices, and system operation.
- D. If corrections are needed, the Contractor will be provided with a Punch-List of all discrepancies. Perform the needed corrections in a timely fashion.
- E. Notify the District when ready to perform a re-inspection of the installation.
- F. Provide 25-year manufacturer's warranty/certification documentation for all copper and fiber cable plant installations.

3.11 CLOSEOUT DOCUMENTS

- A. See section 27 00 00 for requirements.

APPENDIX A – Pre-Approved Materials

DESCRIPTION	MFG	PART NUMBER
Rack Cabinet 7' (43U), 41" Deep	Chatsworth Products	Z4-21N-113C-C12
Wall Mount Cabinet 24" (12 RU) 30" Deep	Chatsworth Products	12419-724
Wall Swing Rack 40RU, 32" Deep	Middle Atlantic	SR-40-32
Zero Clearance Latch Kit	Middle Atlantic	DWRSR-ZL
CUBE-iT Fan Kit	Chatsworth Products	40972-001
20 AMP Power Strip	Chatsworth Products	12848-701
Standard Busbar	Chatsworth Products	10622-010
12" Ladder Rack 10'	Chatsworth Products	11275-712
Ladder Rack Triangular Support Bracket	Chatsworth Products	11746-712
Ladder Rack Wall Angle Support 12"	Chatsworth Products	11421-712
Ladder Rack Butt-Splice Kit	Chatsworth Products	11301-712
Ladder Rack Foot Kit	Chatsworth Products	11309-701
19" Horizontal Cable Manager	Ortronics	808004759
Patch Panel 24-port 1-RU (Black)	Ortronics	OR-SPKSU24
Patch Panel 48-port 2-RU (Black)	Ortronics	OR-SPKSU48
Patch Panel Cable Management Support Bar	Ortronics	OR-CMBFR0RU
Faceplate, 2-port (White)	Ortronics	KSFP2-88
Faceplate, 4-port (White)	Ortronics	KSFP4-88
Surface Mount, 2-port (White)	Ortronics	KSSMB2
Cat6A Data Jacks (White)	Ortronics	KT2J6A-88
Cat6A Data Jacks (Green)	Ortronics	KT2J6A-45
Cat6A Data Jacks (Blue)	Ortronics	KT2J6A-36

STRUCTURED CABLING

27 10 00 - 12

Cat6A Data Jacks (Yellow)	Ortronics	KT2J6A-44
Cat6A Data Jacks (Black)	Ortronics	KT2J6A-00
Cat6A Data Cable, Riser (White = default)	Superior Essex	6B-246-4A
Cat6A Data Cable, Plenum (White = default)	Superior Essex	6B-246-4B
Cat6A Data Cable, Riser (Blue = CCTV/Access Control)	Superior Essex	6B-246-2A
Cat6A Data Cable, Plenum (Blue = CCTV/Access Control)	Superior Essex	6B-246-2B
Cat6A Data Cable, Indoor/Outdoor (Black)	Superior Essex	6B-272-ER
Cat6A Data Cable, OSP (Black)	Superior Essex	04-001-A8
Cat6A Patch Cord (Blue)	Quiktron	576-A10-0xx (xx = length)
Cat6A Patch Cord (Green)	Quiktron	576-A20-0xx (xx = length)
Cat6A Patch Cord (Yellow)	Quiktron	576-A115-0xx (xx = length)
Cat6A Patch Cord (Black)	Quiktron	576-A135-0xx (xx = length)
Cat6A Patch Cord Slim 1' (Blue)	C2G	30125
Cat6A Patch Cord Slim 1' (Green)	C2G	30153
Cat6A Patch Cord Slim 1' (Yellow)	C2G	30167
Cat6A Patch Cord Slim 1' (Black)	C2G	30139
Fiber Optic LIU 1-RU	Ortronics, Infinium	INFC01U-M4-E
Fiber Optic LIU 2-RU	Ortronics, Infinium	INFC02U-M4-E
Fiber Optic Adapter	Ortronics, Infinium	HDFP-LCD12AC
Fiber Optic LC Field Term Connector	Ortronics	205KAN9GASM
Fiber Optic Fanout Kit	Ortronics	61500858
Fiber Optic Cable Single- Mode OS2, Indoor/Outdoor	Superior Essex	W4012J101

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END OF SECTION

SECTION 27 21 00
DATA COMMUNICATIONS NETWORK EQUIPMENT

PART I - GENERAL

1.01 SUMMARY

- A. This section specifies equipment, accessories, materials, installation, configuration, and testing requirements for a complete and operable data network system. The system shall provide reliable and high-performance data communication throughout the site.

1.02 SCOPE

- A. The work will include but not be limited to the following objectives:
 - 1. Provide, coordinate, and install all required equipment and accessories as outlined in the design documents for a complete and operable system.
 - 2. Labor and Materials: The Contractor shall provide and pay for all labor, supervision, materials, accessories, components, equipment, tools, utilities, construction equipment and machinery, transportation, and other facilities and services necessary for the proper execution, operation, and completion of a turn-key system to the District.
 - 3. Data Communications Network Equipment: Includes, but is not limited to:
 - a. Routers
 - b. Firewalls
 - c. Networking Switches
 - d. Wireless Access Points
 - e. VoIP Phone Equipment
 - f. Uninterruptible Power Supplies (UPS)

1.03 RELATED REQUIREMENTS

- A. Division 01 - General Requirements
- B. Section 27 00 00 - Communications
- C. Section 27 05 00 - Common Work Results for Communication Systems.
- D. Section 27 10 00 - Structured Cabling

1.04 QUALIFICATIONS

- A. Contractor shall be located within 50 miles or less from the project site to support 2-hour response time.
- B. Five years' experience installing data network equipment and systems.

1.05 SYSTEM REQUIREMENTS

- A. Any new installations or existing system modifications shall seamlessly integrate into the site's existing data network infrastructure.

1.06 CONTRACTOR "SHOP DRAWINGS" DESIGN REQUIREMENTS

- A. See section 27 00 00 for requirements.

1.07 SUBMITTALS

- A. See section 27 00 00 for requirements.

1.08 WARRANTY

- A. Refer to Division 01 Warranty section.
- B. See section 27 00 00 for additional requirements.

1.09 CLOSEOUT DOCUMENTS

- A. See section 27 00 00 for requirements.

PART 2 - PRODUCTS

2.01 GENERAL

- A. See Appendix A at the end of this document for pre-approved materials.
- B. All products shall be new, unused and without blemishes and shall be of manufacturer's current and standard production.
- C. Drawings and Specifications indicate major system components, and may not show every component, connector, module, or accessory that may be required to support the operation specified. Contractor shall provide all components needed for complete and satisfactory installation/operation.
- D. Product Availability

1. Contractor, prior to submitting a proposal, shall determine product availability and delivery time, and shall include such considerations into his proposed Contract Time.
2. Subject to compliance with these specifications, products and systems included in this section are to be installed as specified by the manufacturer of the system or engineer approved equal.

2.02 EQUIPMENT

- A. The District's preferred manufacturer for:
 1. Routers - Cisco
 2. Firewalls - Cisco
 3. Networking Switches – Cisco
 4. Wireless Access Points - Cisco
 5. VoIP Phone Equipment – Cisco
 6. UPS – N1C
- B. Substitutions require proof of equivalence and approval by District and/or its representative.

PART 3 - EXECUTION

3.01 ACCEPTABLE INSTALLERS

- A. The equipment shall only be installed by Contractors who are qualified to install and maintain the system.
- B. The Contractor (or subcontractor listed at time of bid) must have at least five (5) years' experience installing data network equipment before the Bid Opening Date.

3.02 EXAMINATION

- A. The Contractor shall be required to visit the installation site(s) prior to bidding for the job. The Contractor acknowledges that the failure to visit the site(s) will not relieve the Contractor of the responsibility for observing and considering those conditions which a Contractor would have observed and considered during a site visit, estimating properly the difficulty and cost of successfully performing the Work or proceeding to perform the Work without additional cost to District.
- B. The Contractor shall report any discrepancies between the Specifications, Drawings, and Site Examination prior to the Bid Opening Date.

3.03 PREPARATION

- A. The Contractor shall verify materials are readily available prior to submitting product submittals and notify the Project Manager of long lead time items.
- B. The Contractor shall order all required parts and equipment only after receipt of approved product submittals from the Project Manager.
- C. The Contractor shall coordinate with the District's Technology Services department for needed IP addresses at least 2 weeks prior to configuration/installation.

3.04 SHOP DRAWINGS

- A. The Contractor shall create "Shop Drawings" per section 27 00 00.

3.05 WORKMANSHIP

- A. Quality workmanship is a high priority for the District and the Contractor shall be held to a high-level of professional workmanship.
- B. The District's Project or Construction Manager will have the authority to reject Work which does not conform to the Drawings and Specifications.

- C. Comply with highest industry standards, except when specified requirements indicate more rigid standards or more precise workmanship.
- D. Perform Work with persons experienced and qualified to produce workmanship specified.
- E. Maintain quality control over suppliers and Subcontractors.

3.06 PATHWAY AND EQUIPMENT INSTALLATION

- A. Install all conduit and pathway per design documents. Refer to 27 05 00 for additional information/requirements.
- B. Install all Cat6A cable per design documents. Refer to 27 15 00 for additional information/requirements.
- C. Equipment to be installed per manufacturer's instructions.
- D. Devices requiring PoE power shall be connected to a PoE switch in the MDF/IDF data rack – verify with Technology Services for available PoE power.

3.07 CONFIGURATION

- A. Any information needed from the District for configuration of equipment (i.e. VLAN, etc.) needs to be requested in writing 2 weeks prior.
- B. All equipment to be fully configured and tested for functionality by the Contractor prior to District acceptance testing.

3.08 FIELD QUALITY CONTROL AND TESTING

- A. Upon reaching substantial completion, perform a complete test and inspection of the system. If found to be installed and operating properly, notify the District of readiness to perform the formal Test & Inspection of the complete system by the District or its representative. Make all adjustments/changes required from District/representative review.
- B. Submit the Record Drawings (as-builts) to District for review prior to inspection.
- C. During the formal Test & Inspection (Commissioning) of the system and have personnel available with tools and equipment to inspect wiring, devices, and system operation.
- D. If corrections are needed, the Contractor will be provided with a Punch-List of all discrepancies. Perform the needed corrections in a timely fashion.
- E. Notify the District when ready to perform a re-inspection of the installation.

3.10 AS-BUILT DRAWINGS

- A. See section 27 00 00 for requirements.

APPENDIX A – Pre-Approved Materials

DESCRIPTION	MFG	PART NUMBER
Network Switch (Catalyst 48port PoE)	Cisco	C9300L-48PF-4X-EDU
Network Switch License (DNA Essentials, 48-port, 3-yr)	Cisco	C9300-DNA-E-48-3Y
SFP transceiver (Qty = 2) cable bundle	Cisco	SFP-H10GB-CU1M
Network Switch stacking kit	Cisco	C9300-STACK-KIT
Network Switch stacking cable (3 METER)	Cisco	STACK-T3-3M
Wireless Access Point (Interior)	Cisco	See District for P/N
Wireless Access Point (Exterior)	Cisco	See District for P/N
UPS (MDF 4-post) with network monitoring and external battery (2000VA, 50AH) 120VAC input	N1C	N1C.LR2000, N1C.L4850EBM2U (For 2 post rack mount only - add N1C.24RAILKIT)
UPS (MDF 4-post) with network monitoring and external battery (2000VA, 50AH) 208-240VAC input	N1C	N1C.LR2000G, N1C.L4850EBM2U (For 2 post rack mount only - add N1C.24RAILKIT)
UPS (IDF) with network monitoring (1000 VA) 120VAC input	N1C	N1C.L1000
UPS (IDF) with network monitoring (1500 VA) 120VAC input	N1C	N1C.L1500
Exterior AP Enclosure	Oberon	TBD
Long range point-to-point Ethernet & PoE Extender (Base)	Veracity	VLS-1P-B
Long range point-to-point Ethernet & PoE Extender (Camera)	Veracity	VLS-1P-C

END OF APPENDIX A

END OF SECTION

SECTION 28 10 00
ACCESS CONTROL SYSTEM

PART I - GENERAL

1.01 SUMMARY

- A. This section specifies equipment, accessories, materials, installation, configuration, and testing requirements for a complete and operable electronic Access Control system. The system shall provide electronic access to secure doorways to authorized persons at authorized time of day.

1.02 SCOPE

- A. The work will include but not be limited to the following objectives:
1. Labor and Materials: The Contractor shall provide and pay for all labor, supervision, materials, accessories, components, equipment, tools, transportation, and other facilities and services necessary for the proper installation of a turn-key Access Control system to the District.
 2. The contractor will coordinate with the District in writing for any needed information (i.e. IP addresses, etc.) at least 2 weeks prior to the date the information is needed.
 3. Access Control software and equipment: Includes, but is not limited to:
 - a. Software based system for user authentication and system control
 - b. RFID cards/fobs
 - c. RFID readers
 - d. Door controllers
 - e. Power supplies
 - f. Electrified door hardware/latches/strikes
 - g. Door position switches
 - h. Power transfer hinges/armored loops
 - i. Request to exit (REX) devices
 - j. RFID badge printer (optional)
 4. Typical installation includes software, door controller, card reader, door sensor, request to exit (REX) sensor and a surface mounted electric strike designed to accommodate existing panic hardware. For doors with electrified lockset have bored doors and electric power transfer hinges see section (08 71 00 – Door Hardware for more information).
 5. All installations with network connectivity shall utilize District's network and be managed by the District's Avigilon ACM Enterprise system.

6. Access control hardware shall continue to fully function in the event of communication loss to the central server.
7. Power to control panels shall be hardwired in conduit.
8. All door controllers shall have battery backup.

1.03 RELATED REQUIREMENTS

- A. Division 01 – General Requirements
- B. Section 08 71 00 – Door Hardware
- C. Section 27 00 00 - Communications
- D. Section 27 05 00 – Common Work Results for Communication Systems.
- E. Section 27 10 00 – Structured Cabling
- F. Americans with Disability Act (ADA)

1.04 REFERENCES

- A. See section 27 00 00 for requirements.

1.05 DEFINITIONS

- A. See section 27 00 00 for requirements.

1.06 SYSTEM REQUIREMENTS

- A. Any new installations or existing system modifications shall seamlessly integrate into the site's existing Access Control systems and integrate into the Districts Avigilon ACM Enterprise installation.

1.07 SUBMITTALS

- A. See section 27 00 00 for requirements.

1.08 CONTRACTOR "SHOP DRAWINGS" DESIGN REQUIREMENTS

- A. See section 27 00 00 for requirements.

- B. Shop drawings are required for this section.

1.09 QUALIFICATIONS

- A. Contractor shall be located within 50 miles or less from the project site to support 2-hour response time.
- B. Five (5) years' experience installing communications equipment systems.

1.10 CERTIFICATIONS

- A. See section 27 00 00 for requirements.

1.11 WORKMANSHIP

- A. Quality workmanship is a high priority for the District and the Contractor shall be held to a high-level of professional workmanship.
- B. The District's Project or Construction Manager will have the authority to reject Work which does not conform to the Drawings and Specifications.
- C. Comply with highest industry standards, except when specified requirements indicate more rigid standards or more precise workmanship.
- D. Perform Work with persons experienced and qualified to produce workmanship specified.
- E. Maintain quality control over suppliers and Subcontractors.
- F. Contractor shall be responsible for scheduling Subcontractors in a timely fashion.

1.12 WARRANTY

- A. Refer to Division 01 Warranty section.
- B. See section 27 00 00 for additional requirements.

1.13 CLOSEOUT DOCUMENTS

- A. See section 27 00 00 for requirements.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Manufacturers - See Appendix A at the end of this document for pre-approved materials.
- B. All products shall be new, unused and without blemishes and shall be of manufacturer's current and standard production.
- C. Drawings and Specifications indicate major system components, and may not show every component, connector, module, or accessory that may be required to support the operation specified. Contractor shall provide all components needed for complete and satisfactory installation and operation.
- D. Product Availability
 - 1. Contractor, prior to submitting a proposal, shall determine product availability and delivery time, and shall include such considerations into his proposed Contract Time.
 - 2. Subject to compliance with these specifications, products and systems included in this section are to be installed as specified by the manufacturer of the system or engineer approved equal.

2.02 EQUIPMENT

- A. See Appendix A at the end of this document for pre-approved materials.
- B. Substitutions require proof of equivalence and prior approval by District and/or its representative before ordering.
- C. Whenever possible and required the request to exit functionality shall be integrated into the door hardware.
- D. Electrified latch hardware shall be compatible with panic hardware and be "rim" style.
- E. Panel cabinets shall have key locks.
- F. The contractor shall furnish at least 100 RFID cards serialized per the District's standards. Middle Schools and High Schools to receive 200 RFID cards.

2.03 EXTRA STOCK

A. For each increment of 100 controlled doors furnish:

1. Quantity 5 of current model door controller.
2. Quantity 7 of current model card reader.

PART 3 - EXECUTION**3.01 ACCEPTABLE INSTALLERS**

- A. The equipment shall only be installed by Contractors who are qualified to install and maintain the system.
- B. The Contractor (or subcontractor listed at time of bid) must have at least five (5) years' experience installing electronic access control equipment before the Bid Opening Date.

3.02 EXAMINATION

- A. The Contractor shall be required to visit the installation site(s) prior to bidding the job. The Contractor acknowledges that the failure to visit the site(s) will not relieve the Contractor of the responsibility for observing and considering those conditions which a Contractor would have observed and considered during a site visit, estimating properly the difficulty and cost of successfully performing the Work or proceeding to perform the Work without additional cost to District.
- B. The Contractor shall report any discrepancies between the Specifications, Drawings, and Site Examination prior to the Bid Opening Date.

3.03 PREPARATION

- A. The Contractor shall verify materials are readily available prior to submitting product submittals and notify the District's Project Manager of long lead time items.
- B. The Contractor shall order all required parts and equipment only after receipt of approved product submittals from the District's Project Manager.
- C. Submit and receive approval shop drawings prior to work commencement.

3.04 PATHWAY INSTALLATION

- A. New Construction:
 - 1. Install 3/4" EMT in wall from hollow door frame to double-gang mud-ring and deep 4" Sq. back box on interior latch side above door frame at 96" AFF to top of box to accessible ceiling space or continuous conduit to nearest IDF.
 - 2. Install on the exterior latch side of the door a single-gang mud-ring and back box for exterior card reader at 48" AFF to top of box. Route EMT conduit to above door 4"-Sq. j-box.
- B. Existing Construction:
 - 1. Refer to design documents.

2. Surface raceway and components shall be Wiremold 2300.

3.05 EQUIPMENT INSTALLATION

- A. Power supplies and electric strike to use 24VDC and 16AWG wire.
- B. Power supplies shall be centrally located in the nearest MDF/IDF.
- C. Equipment to be wired and installed per manufacturer's instructions.
- D. Door controllers to be installed in nearest MDF/IDF unless noted otherwise on design documents.
- E. Devices requiring POE power shall be connected to a POE switch in the nearest MDF/IDF data rack – verify with Electronics/Lock Shop for available PoE.
- F. All wiring in enclosure shall have 12" minimum service loop for troubleshooting/repairs.
- G. All shielded wiring to have shields grounded at the upstream end only. Floating shields is strictly prohibited.
- H. Data drops to be installed inside the controller panel cabinet.

3.06 LABELING/SCHEDULES

- A. All labels are to be machine generated black letters on white adhesive label stock that is appropriate for the installation environment (interior/exterior).
- B. Device ID Labels are to be 1/4" lettering for mounting heights 10' AFF or less, 1/2" black lettering on white labels for mounting heights greater than 10' AFF.
- C. Access Control Panel/Cabinet label – Panel ID on exterior top right of panel door.
- D. Battery label – Install date.
- E. Wiring label – Panel ID-Panel Schedule-Door ID.
- F. Network Information label – MAC and IP address on interior top right of panel door.
- G. Network Cable Termination label - MDF/IDF-port number.
- H. Reader/Door schedule – A reader/door schedule and location drawing shall be printed and installed in a plastic sleeve inside the panel cover door.

3.09 CONFIGURATION

- A. Program all network equipment with network IP address information obtained from Electronics/Lock Shop.
- B. All equipment to be fully configured and tested for functionality prior to testing.

3.10 FIELD QUALITY CONTROL AND TESTING

- A. Upon reaching substantial completion, perform a complete test and inspection of the system. If found to be installed and operating properly, notify District of your readiness to perform the formal Test & Inspection of the complete system.
- B. Submit the Record Drawings (as-builts) to District for review prior to inspection.
- C. During the formal Test & Inspection (Commissioning) of the system the Contractor shall have personnel available with tools and equipment to inspect wiring, devices, and system operation.
- D. If corrections are needed, the Contractor will be provided with a Punch-List of all discrepancies. Perform the needed corrections in a timely fashion.
- E. Notify the District when ready to perform a re-inspection of the installation.
- F. District or its representative to provide final sign-off for acceptance.

3.11 AS-BUILT DRAWINGS

- A. See section 27 00 00 for requirements.
- B. As-built riser diagram showing all access control components for site.

APPENDIX A – Pre-Approved Materials

DESCRIPTION	MFG	PART NUMBER
Door Controller (1-door)	Avigilon	AC-MER-CONT-LP1501
Door Controller (2-door)	Avigilon	AC-MER-CONT-LP1502
Door Controller (1-door/slave PoE)	Avigilon	AC-MER-CON-MR62E
2-Reader Interface Module	Avigilon	AC-MER-CON-MR52
Card Reader	Avigilon	AC-ING-READ-APTIQ-SNG-MT15
Card Reader (Mullion)	Schlage	MT11-485
Power Supply/Cabinet (2 Door)	Avigilon	AC-LSP-2DR-MER-LCK
Power Supply/Cabinet (8 Door)	Avigilon	AC-LSP-8DR-MER-LCK
Video Intercom	Avigilon	3.0C-H4VI-RO1-IR
Electronic Surface Strike (rim style)	Assa Abloy/HES	9600
Electronic Surface Strike (rim style)	Von Duprin	6300
Electronic Latch Set (mortise)	Schlage	ND96EUPD
Latch Retraction Motor (Von Duprin)	Von Duprin	QEL
Latch Retraction Motor (Jackson)	Command Access	MLRK1-JAC12REX
Power Transfer	Von Duprin	EPT
Door Position Switch	George Risk Industries, Inc.	195-12WG
Battery 12VDC, 8AH	ELK, Powersonic	ELK-1280, PS-1280
Proximity Cards	Schlage	8520 - Serialized per District Requirements
Armored Door Loop	SDC	PT-3/8

END OF SECTION

SECTION 32 16 00

SITE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. SECTION INCLUDES:

1. The Section describes the requirements for providing portland cement concrete paving, including accessibility ramps, sidewalks, accessible routes of travel, vehicular travel, drain structures, sewer structures, thrust blocks and for other non-structural or non-vehicular applications.

B. RELATED SECTIONS

1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
2. Section 01 50 00, Construction Facilities and Temporary Controls.
3. Section 32 31 19: Decorative Metal Fences and Gates.

1.02 REFERENCES AND STANDARDS

- A. 2022 California Building Code, latest edition.
- B. ACI Standards, ACI 211.1, ACI 318-19, ACI 302, IR-04, ACI 301-16, ACI 305R-10, ACI 306R-16, ACI 308-16.
- C. ASTM C-94, Specification for Ready-Mixed Concrete.
- D. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice (latest edition).
- E. ASTM – American Society for Testing and Materials.

1.03 SUBMITTALS

- A. Refer to Section 01 33 00.
- B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.
- C. Materials list: Submit to the Architect a complete list of all materials proposed to be used in this portion of the work. Submitted items should include but are not limited to sand, gravel, admixtures, surface

treatments, coloring agents, sealers, fibers, cast-in-place accessories, forming and curing products and concrete mix designs.

- D. With concrete submittal, provide documented history of mix design performance.

1.04 QUALITY ASSURANCE

- A. Use only new materials and products.
- B. Use materials and products of one manufacturer whenever possible.
- C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.
- D. Sieve analysis from testing laboratories identifying rock/sand percentages within the concrete mix; or class 2 aggregate base shall have the current project name and project location identified on the report. Outdated analytical reports greater than 90 days old will not be accepted

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.
- B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.
- C. Transport, store and handle in strict accord with the manufacturer's written recommendations.
- D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.
- E. Store cement in weather tight building, permitting easy inspection and identification. Protect from dampness. Lumpy or stale cement will be rejected.
- F. Aggregates: Prevent excessive segregation, or contamination with other materials or other sizes of aggregate. Use only one supply source for each aggregate stock pile.

1.06 WARRANTY

- A. Refer to General Conditions and Section 01 78 36.

1.07 TESTING

- A. General: Refer to Section 01 45 00 – Quality Requirements.
- B. Cement and Reinforcing shall be tested in accordance with CBC Section 1910A. Testing of reinforcing

may be waived in accordance with Section 1910A.2 when approved by the Structural Engineer and DSA.

1.08 ADEQUACY AND INSPECTION

- A. Design, erect, support, brace and maintain formwork and shoring to safely support all vertical and lateral loads that might be applied until such loads can be carried by concrete.
- B. Notify Inspector, Architect and DSA at least 48 hours prior to placing of concrete.

1.09 PROTECTION

- A. Finish surfaces shall be protected at all times from concrete pour. Inspect forming against such work and establish tight leak-proof seal before concrete is poured. Finish work damaged, defaced or vandalized during the course of construction shall be replaced by contractor at contractor expense.

1.10 FIELD MEASUREMENTS

- A. Make and be responsible for all field dimensions necessary for proper fitting, slopes and completion of work. Report discrepancies to Architect before proceeding.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cement: Portland cement, ASTM C150, Type II, per ACI 318-19 Section 26.4.
- B. Concrete Aggregates: Normal weight aggregates shall conform to ASTM C33, except as modified by this section. Combined grading shall meet limits of ASTM C33. Lightweight aggregate shall conform to ASTM C330, suitably processed, washed and screened, and shall consist of durable particles without adherent coatings.
- C. Water: Clean and free from deleterious amounts of acids, alkalis, scale, or organic materials and per ACI 318-19 Section 26.4.1.3.1.
- D. Fly Ash: Western Fly Ash, conforming to ASTM C618 for Class N or Class F materials (Class C is not permitted). Not more than 15% (by mass) may be substituted for portland cement.
- E. Water Reducing Admixture: Admixture to improve placing, reduce water cement ratio, and ultimate shrinkage may be used. Provide WRDA 64 by Grace Construction Products or approved equal. Admixture shall conform to ASTM C494 and ACI 318-19 Section 26.4.1.4.19(a). Such admixture must receive prior approval by the Architect, Structural Engineer, and the Testing Lab, and shall be included in original design mix.
- F. Air-entraining Admixture: Daravair 1000 by Grace Construction Products or approved equal. Admixture must conform to ASTM C260 and ACI 318-19, section 26.4.1.4.
- G. Surface Retarder (for exposed aggregate finishes): Rugasol-S by Sika Corporation or approved equal.

- H. Form Coating: Material which will leave no residue on concrete surface that will interfere with surface coating, as approved by the Architect.
- I. Reinforcement Bars: New billet steel deformed bars conforming to requirements of ASTM A615 or ASTM A706; Grade 60. Dowels for installation through expansion joints or construction joints to existing sidewalks or concrete features shall be smooth or shall be sleeved on one end for slippage.
- J. Reinforcing supports: Galvanized metal chairs or spacers or metal hangers, accurately placed 3'-0" O.C.E.W. Staggered and each support securely fastened to steel reinforcement in place. Bottom bars in footings may be supported with 3" concrete blocks with embedded wire ties. Concrete supports without wire ties will not be allowed.
- ~~K. Truncated Domes: Vitrified Polymer Composite (VPC), Cast-In-Place Detectable/Tactile Warning Surface Tiles; "Armor-Tile", "Access Tile Tactile Systems", or approved equal. Tiles shall comply with Americans with Disabilities Act and the California Code of Regulations (CCR) Title 24, Part 2, Chapter 11B (dome spacing shall be 2.35"). Install tiles as recommended by manufacturer. Color, federal yellow (FS 33538).~~
- L. Curing Compound (for exterior slabs only): Burke Aqua Resin Cure by Burke by Edoco, 1100 Clear by W.R. Meadows or accepted equal. Water based membrane-forming concrete curing compound meeting ASTM C 309 and C1315.
- M. Concrete Bonding Agent: Weld-Crete by Larson Products Corp., Daraweld C by Grace Construction Products or accepted equal.
- N. Patching Mortar: Meadow-Crete GPS, one-component, trowel applied, polymer enhanced, shrinkage-compensated, fiber reinforced, cementitious repair mortar for horizontal, vertical and overhead applications as manufactured by W.R. Meadows or accepted equal.
- O. Non-shrink Grout: Masterflow 713 Plus by Master Builders or approved equal. Premixed, non-metallic, no chlorides, non-staining and non-shrinking per CRD-C621, Corps of Engineers Specification and ASTM C 1107, Grades B and C.
- P. Aggregate Base: Class 2 AB per Caltrans specification section 26-1.02A.
- Q. Expansion Joint Material: Preformed 3/8" fiber material, full depth of concrete section, with bituminous binder manufactured for use as concrete expansion joint material, as accepted by the Architect.
- R. Joint sealant for expansion joints: Single component silicone sealant, Type S, ASTM D5893.
 - 1. Reference Standard: ASTM C920, Grade P, Class 25, Use T.
 - 2. Dow Corning 890-SL (self-leveling) Silicone, or accepted equal.
 - 3. Dow Corning 888-NS (non-sagging) Silicone, at slopes exceeding 5%. May not be used at asphalt surfaces.
 - 4. Color: Custom color as selected by Architect.
- S. Pre- Formed plastic Expansion Joint; W.R. Meadows 3/8" "Snap Cap", Tex-Trude expansion joint cap, or

an approved equal.

T. Adhesive Anchoring (Epoxy): Hilty HIT-HY 200 Safe Set, or approved equal.

2.02 CONCRETE DESIGN AND CLASS

- A. Class "B": Concrete shall have 1" max. size aggregate, shall have 3000 psi min. at 28 day strength with a maximum water to cementitious ratio no greater than 0.50. Use for exterior slabs, including walks, vehicular paved surfaces, manhole bases, poured-in-place drop inlets, curbs, valley gutters, curb & gutter and other concrete of like nature.
- B. Slump Limits: Provide concrete, at point of final discharge, of proper consistency determined by Test Method ASTM C143 with a slumps of 4" plus or minus 1".
- C. Mix Design: All concrete used in this work will be designed for strength in accordance with provisions of ASI 318-19 Section 26.4. Should the Contractor desire to pump concrete, a modified mix design will need to be submitted for review. Fly ash may be used in concrete to improve workability in amounts up to 15% of the total cementitious weight.
- D. Air Entrainment; Per the Local Jurisdiction minimum requirements, or 3% minimum.

2.03 MIXING OF CONCRETE

- A. Conform to requirements of CBC, Chapter 19A.
- B. All concrete shall be mixed until there is uniform distribution of material and mass is uniform and homogenous; mixer must be discharged completely before the mixer is recharged.
- C. Concrete shall be Ready-mixed Concrete: Mix and deliver in accordance with the requirements set forth in ASTM C94 and ACI 301. Batch Plant inspection may be waived in accordance with CBC Section 1705A.3.3.1, when approved by Structural Engineer and DSA.
 - 1. Approved Testing Laboratory shall check the first batching at the start of the work and furnish mix proportions to the Licensed Weighmaster.
 - 2. Licensed Weighmaster to positively identify materials as to quantity and to certify to each load by ticket.
 - 3. Ticket shall be transmitted to Project Inspector by truck driver with load identified thereon. Project Inspector will not accept load without load ticket identifying mix and will keep daily record of pours, identifying each truck, its load and time of receipt and will transmit two copies of record to DSA.
 - 4. At end of project, Weighmaster shall furnish affidavit to DSA on form satisfactory to DSA, certifying that all concrete furnished conforms in every particular and to proportions established by mix designs.
 - 5. Placement of concrete shall occur as rapidly as possible after batching and in a manner which will assure that the required quality of the concrete is maintained. In no case may concrete be placed more than 90 minutes from batch time.
 - 6. Water may be added to the mix only if neither the maximum permissible water-cement ratio

nor the maximum slump is exceeded. In no case shall more than 10 gallons of water shall be added to a full 9 yard load, or 1 gal. per yard on remaining concrete within the drum providing load tag indicates at time of mixing at plant will allow for additional water.

2.04 MATERIALS TESTING

- A. Materials testing of concrete and continuous batch plant inspection may be waived in accordance CBC Sections 1704A.4.4 when approved by Structural Engineer and DSA.
- B. Testing of concrete shall be performed per article 3.12 of this specification.

2.05 EQUIPMENT

- A. Handling and mixing of concrete: Project Inspector may order removal of any equipment which in his opinion is insufficient or in any way unsuitable.

PART 3 - EXECUTION

3.01 APPROVAL OF FORMS AND REINFORCEMENTS

- A. Forms and reinforcements are subject to approval by the Project Inspector, and notice of readiness to place first pour shall be given to DSA, Architect and Structural Engineer 48 hours prior to placement of concrete. Before placing concrete, clean tools, equipment and remove all debris from areas to receive concrete. Clean all reinforcing and other embedded items off all coatings oil, and mud that may impair bond with concrete.
- B. All reinforcing steel shall be adequately supported by approved devices on centers close enough to prevent any sagging.
- C. All reinforcing bar lap splices shall be staggered a minimum of 5 ft.
- D. Additional reinforcing steel shall be placed around all utility boxes, valve boxes, manhole frames and covers that are located within the concrete placements.
 - 1. The bars shall be placed so that there will be a minimum of 1 ½" clearance and a maximum of 3" clearance. The reinforcing steel shall be placed mid-depth of concrete slab.
- E. At all right angles or intersections of concrete walks, additional 2'x2' #5, 90 degree bars shall be added at all inside corners for additional crack control. The bars shall be placed 2" from concrete forms and supports at mid-depth of slab.

3.02 PROTECTION

- A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.
- B. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at

no additional cost to the Owner.

- C. Sub-Grade in vehicular concrete paved areas: Subgrade shall be clean, shaped and compact to hard surface free from elevations or depressions exceeding 0.05' in 10' from true plan. Compact per Section 31 00 00. Compaction and moisture content shall be verified immediately prior to placement of concrete. Proof roll subbase in presence of geotechnical engineer prior to placement of aggregate base.

3.03 CLEANING

- A. Reinforcement and all other embedded items at time of placing concrete to be free of rust, dirt oil or any other coatings that would impair bond to concrete.
- B. Remove all wood chips, sawdust, dirt, loose concrete and other debris just before concrete is to be poured. Use compressed air for inaccessible areas. Remove all standing water from excavations.

3.04 FORMING

- A. Form material shall be straight, true, sound and able to withstand deformation due to loading and effects of moist curing. Materials which have warped or delaminated, or require more than minor patching of contact surfaces, shall not be reused.
- B. Build forms to shapes, lines, grades and dimensions indicated. Construct form work to maintain tolerances required by ACI 301. Forms shall be substantial, tight to prevent leakage of concrete, and properly braced and tied together to maintain position and shape. Butt joints tightly and locate on solid backing. Chamfer corners where indicated. Form bevels, grooves and recesses to neat, straight lines. Construct forms for easy removal without hammering, wedging or prying against concrete.
- C. Space clamps, ties, hangers and other form accessories so that working capacities are not exceeded by loads imposed from concrete or concreting operations.
- D. Build openings into vertical forms at regular intervals if necessary to facilitate concrete placement, and at bottoms of forms to permit cleaning and inspection.
- E. Build in securely braced temporary bulkheads, keyed as required, at planned locations of construction joints.
- F. Slope tie-wires downward to outside of wall.
- G. Brace, anchor and support all cast-in items to prevent displacement or distortion.
- H. During and immediately after concrete placing, tighten forms, posts and shores. Readjust to maintain grades, levels and camber.
- I. Concrete paving, Curbs, Curb and Gutters, Ramps:
 - 1. Expansion Joints: Install at locations indicated, and so that maximum distance between joints is 20' for exterior concrete unless otherwise shown. Expansion joint material shall be full depth of

concrete section. Recess for backer rod and sealant where required. Expansion joints shall not exceed ¼ inch depth measured from finish surface to top of felt or sealant, and ½ inch width.

2. Curbs, Valley Gutter, and Curb & Gutter: Install expansion joints at 60' on center, except when placing adjacent to concrete walks, the expansion joints shall align with the expansion joints shown for the concrete walks. Expansion joint material shall be full depth of concrete section. Recess for backer rod and sealant will be required.
3. Isolation Joints: 3/8" felt between walls and exterior slabs or walks so that paved areas are isolated from all vertical features, unless specifically noted otherwise on plans.
4. Exterior Concrete Paving: Install expansion joints at 20' on center maximum, both directions, unless shown otherwise on plans.
5. Ramps; whether shown or not all ramps shall have control joints and expansion joints.
 - a. Control joints on ramps shall be aligned and be placed in between with the vertical posts for the handrails. The curbs, if required shall have control joints that align with the handrail posts.
 - b. Expansion joints shall be placed at the upper, intermediate, and bottom landings.

3.05 FORM COATING

- A. Before placement of reinforcing steel, coat faces of all forms to prevent absorption of moisture from concrete and to facilitate removal of forms. Apply specified material in conformance with manufacturer's written directions.
- B. Before re-using form material, inspect, clean thoroughly and recoat.
- C. Seal all cut edges.

3.06 INSTALLATION

- A. General: Reinforcement shall be accurately placed at locations indicated on the drawings within required tolerances and providing required clearances. Reinforcement shall be secured prior to placement of concrete such that tolerances and clearances are maintained. Coverage shall be in accordance with Section 1907A.7 of the CBC. Keep a person on the job to maintain position of reinforcing as concrete is placed. Reinforcement must be in place before concreting is begun. Install dowels as shown on drawings. Give notice whenever pipes, conduits, sleeves, and other construction interferes with placement; obtain method of procedure to resolve interferences. All expansion and construction joints in concrete shall have dowels of size and spacing as shown, or as approved by Architect.
- B. Placing Tolerances:
 1. Per ACI 301 or CRSI/WCRSI Recommended Practice for Placing Reinforcing Bars, unless otherwise shown.
 2. Clear distance between parallel bars in a layer shall be no less than 1", the maximum bar diameter not 1 ½ times the maximum size of coarse aggregate.
- C. Splices:

1. General: Unless otherwise shown on drawings, splice top reinforcing at midspan between supports, splice bottom reinforcing at supports and stagger splices at adjacent splices 5 foot minimum. Bar laps shall be wired together. Reinforcing steel laps shall be as follows:
 - a. Lap splices in concrete: Lap splice lengths shall not be less than 62 bar diameter for No. 5 bar, 56" minimum for No. 6 bars. No. 4 bar shall have a minimum of 24" splice. 93 bar diameters for No. 7 bars and larger.
 - b. All splices shall be staggered at 5 feet minimum.

3.07 INSPECTION

- A. Approval of reinforcing steel, after installation, must be received from Inspector. Architect, Structural Engineer and DSA must be notified 48 hrs. in advance of beginning of concrete placement operations.
- B. Slope of concrete forms and finish condition shall be checked with a two foot (2') digital level.

3.08 PLACING OF CONCRETE

- A. Adjacent finish surfaces shall be protected at all times during the concrete pour and finishing. Verify that all formwork is tight and leak-proof before concrete is poured. Finish work defaced during the concrete pour and finishing shall be replaced at no extra cost to the owner.
- B. Transport concrete from mixer to place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients. Deposit as close as practicable in final position to avoid re-handling or flowing. Partially hardened concrete must not be deposited in work. Concrete shall not be wheeled directly on top of reinforcing steel.
- C. Placing: Once started, continue concrete pour continuously until section is complete between predetermined construction joints. Prevent splashing of concrete onto adjacent forms or reinforcement and remove such accumulation of hardened or partially hardened concrete from forms or reinforcement before work proceeds in that area. Free fall of concrete shall not to exceed 4'-0" in height. If necessary, provide lower openings in forms to inject concrete and to reduce fall height.
- D. Remove form spreaders as placing of concrete progresses.
- E. Place footings as monolithic and in one continuous pour.
- F. Keep excavations free of standing water, but moisture condition sub-grade before concrete placement.
- G. Compacting: All concrete shall be compacted by mechanical vibrators. Concrete shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms. Vibrating shall not be applied to concrete which has already begun to initially set nor shall it be continued so long as to cause segregation of materials.
- H. Concrete Flatwork:
 1. All flatwork shall be formed and finished to required line and grades. Flatwork shall be true and flat with a maximum tolerance of 1/8" in 10' for flatness. Flatwork which is not flat and are outside of

the maximum specified tolerances shall be made level by the Contractor at no additional expense to the Owner.

2. Thoroughly water and soak the flatwork subgrade as required to achieve required moisture content prior to the concrete pour. Provide damming as required to keep water within the formed area and to allow for proper saturation of the subgrade.
 3. Concrete vibrator shall be used to assist concrete placement. Contractor shall have spare concrete vibrator on site during concrete placement.
- I. Placing in hot weather: Comply with ACI 305R-10. Concrete shall not exceed 85 degrees F at time of placement. Concrete shall be delivered, placed and finished in a sufficiently short period of time to avoid surface dry checking. Concrete shall be kept wet continuously after tempering until implementation of curing compound procedure in accordance with this specification.
- J. Placing in cold weather: Comply with ACI 306R-16. Protect from frost or freezing. No antifreeze admixtures are permitted. When deposited concrete during freezing or near-freezing weather, mix shall have temperature of at least 50 degrees F but not more than 90 degrees F. Concrete shall be maintained at temperature of at least 50 degrees F for not less than 72 hours after placing or until it has thoroughly hardened. Provide necessary thermal coverings for any flat work exposed to freezing temperatures.
- K. Horizontal construction joint: Keep exposed concrete face of construction joints continuously moist from time of initial set until placing of concrete; thoroughly clean contact surface by chipping entire surface not earlier than 5 days after initial pour to expose clean hard aggregate solidly embedded, or by approved method that will assure equal bond, such as green cutting. If contact surface becomes contaminated with soil, sawdust or other foreign matter, clean entire surface and re-chip entire surface to assure proper adhesion.

3.09 CONCRETE FINISHES

- A. Concrete Slab Finishing: Finish slab as required by ACI 302.1R. Use manual screeds, vibrating screeds to place concrete level and smooth. Use "jitterbugs" or other special tools designed for the purpose of forcing the course aggregate below the surface leaving a thick layer of mortar 1 inch in thickness. Surface shall be free from trowel marks, depressions, ridges or other blemishes. Tolerance for flatness shall be 1/8" in 10'. Provide final finish as follows:
1. Flatwork, medium broom finish: Typical finish to be used at all exterior walks and stairs.
 2. Ramps, heavy broom finish: Concrete surfaces with slope greater than 5% including all ramps. Brooming direction shall run perpendicular to slope to form non-slip surface
 3. Under no circumstances can water be added to the top surface of freshly placed concrete.
- B. Curb Finishing: Steel trowel.
- C. Joints and Edges: Mark-off exposed joints, where indicated, with ¼" radius x 1" deep jointer or edging tool. Joints to be clean, cut straight, parallel or square with respect to concrete walk edge. Tool all edges of exposed expansion and contraction joints, walk edges, and wherever concrete walk adjoins other material or vertical surfaces.

1. The expansion joints shall be full depth as shown in the plan details. Failure to do so will result in non-compliance and shall be immediately machine cut by the contractor at his expense.
- D. Stair Treads and Risers: Tool exterior stair tread nosing per ADA requirements and as detailed. Paint or stain tooled area at every stair tread nosing or as detailed. Stair tread nosing shall contain no pockets, voids or spalls. Patching is not allowed. Damaged nosing shall be replaced.

3.10 CURING

- A. Cured Concrete in Forms: Keep forms and top on concrete between forms continuously wet until removal of forms, 7 days minimum. Maintain exposed concrete in a continuous wet condition for 14 days following removal of forms.
- B. Flatwork/Variable Height Curbs, Curb and gutter, Valley Gutter: Cure utilizing Curing Compound. If applicable, the Contractor shall verify that the approved Curing Compound is compatible with the approved colorant system. Upon completion of job, wash clean per manufacturer's recommendations.
 1. Curing compound shall be applied in a wet puddling application. Spotty applications shall be reason for rejection and possibly concrete removal and replacement at the contractor's expense with no compensation from the owner.
- C. No Curing Compound shall be applied to areas scheduled to receive resilient track surface including, curbs, ramps, run ways, etc.

3.11 DEFECTIVE CONCRETE

- A. Determination of defective concrete shall be made by the Architect or Engineer. His opinion shall be final in identifying areas to be replaced, repaired or patched.
- B. The Owner reserves the right to survey the flatwork, if it is determined to be outside of the maximum tolerance for flatness. If the flatwork is found to be out of tolerance, then the Contractor will be required to replace concrete. The Contractor will be responsible for reimbursing the Owner for any surveying costs incurred. Determination of flatwork flatness, surveying and any remedial work must be completed far enough in advance so that the project schedule is maintained, delays are avoided and the new flatwork or flatwork repairs are properly cured.
- C. As directed by Architect, cut out and replace defective concrete. All defective concrete shall be removed from the site. No patching is to be done until surfaces have been examined by Architect and permission to begin patching has been provided.
- D. Permission to patch any area shall not be considered waiver of right, by the Owner, to require removal of defective work, if patching does not, in opinion of Architect, satisfactorily restore quality and appearance of surface.
- E. Defective concrete is:
 1. Concrete that does not match the approved mix design for the given installation type.

2. Concrete not meeting specified 28-day strength.
 3. Concrete which contains rock pockets, voids, spalls, transverse cracks, exposed reinforcing, or other such defects which adversely affect strength, durability or appearance.
 4. Concrete which is incorrectly formed, out of alignment or not plumb or level.
 5. Concrete containing embedded wood or debris.
 6. Concrete having large or excessive patched voids which were not completed under Architect's direction.
 7. Concrete not containing required embedded items.
 8. Excessive Shrinkage, Traverse cracking, Cracking, Curling; or Defective Finish. Remove and replace if repair to an acceptable condition is not feasible.
 9. Concrete that is unsuitable for placement or has set in truck drum for longer than 90 minutes from the time it was batched.
 10. Expansion joint felt that is not isolating the full depth of the concrete section, and recessed as required for backer rod and sealant where required.
 11. Concrete that is excessively wet or excessively dry and will not meet the minimum or maximum slump required per mix design.
 12. Finished concrete with oil stains from equipment use, and or rust spots that cannot be removed.
 13. Control joints (weakened planed joints) that do not meet the required minimum depth shown on the drawings.
- F. Patching: Install specified Patching Mortar per manufacturer's recommendations. REPAIRS TO DEFECTIVE CONCRETE WHICH AFFECT THE STRENGTH OF ANY STRUCTURAL CONCRETE MEMBER OR COMPONENT ARE SUBJECT TO APPROVAL BY THE ARCHITECT AND DSA.

3.12 CONCRETE TESTING

- A. Comply with CBC Section 1903A, 1905A.1.16, 1910A and 1705A.3 and as specified in B. below. Costs of tests will be borne by the Owner.
- B. Four identical cylinder samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards of concrete, or not less than once for each 2,000 square feet of surface area for slabs or walls. In addition, samples for strength tests for each class of concrete shall be taken for seven-day tests at the beginning of the concrete work or whenever the mix or aggregate is changed.
- C. Strength tests will be conducted by the Testing Lab on one cylinder at seven (7) days and two cylinders at twenty-eight (28) days. The fourth remaining cylinder will be available for testing at fifty-six (56) days if the 28-day cylinder test results do not meet the required design strength.
- D. On a given project, if the total volume of concrete is such that the frequency of testing required by paragraph B. above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.
- E. Cost of retests and coring due to low strength or defective concrete will be paid by Owner and back-charged to the Contractor.

F. Each truck shall be tested for slump before concrete is placed.

3.13 REMOVAL OF FORMS

A. Remove without damage to concrete surfaces.

B. Sequence and timing of form removal shall insure complete safety of concrete structure.

C. Forms shall remain in place for not less than the following periods of time. These periods represent cumulative number of days during which temperature of air in contact with concrete is 60 degrees F and above.

1. Vertical forms of foundations, walls and all other forms not covered below: 5 days.
2. Slab edge screeds or forms: 7 days.
3. Concrete columns and beam soffits: 28 days.

D. Concrete shall not be subjected to superimposed loads (structure or construction equipment) until it has attained its full design strength and not for a period of at least 21 days after placing. Concrete systems shall not be subjected to construction loads in excess of design loads.

3.14 CLEANING

A. Refer to Section 01 77 00.

B. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.

C. Clean excess material from surface of all concrete walks and utility structures.

D. Power wash all concrete surfaces to remove stains, dried mud, tire marks, and rust spots.

END OF SECTION

SECTION 32 31 19
DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.01 SUMMARY

A. SECTION INCLUDES:

1. Ornamental picket fencing, gates and accessories.
2. Custom accessible pedestrian gates.

B. RELATED SECTIONS:

1. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
2. Section 05 50 00: Metal Fabrications.
3. Section 08 71 00: Door Hardware (except hinges which are specified herein).
3. Section 32 16 00: Site Concrete.

1.03 SUBMITTALS

- A. Shop Drawings: Layout of all fences and gates with dimensions, details and finishes of component accessories and post foundations.
- B. Product Data: Manufacturer's catalogue cuts indicating material compliance and specified options including steel tube sizes.
- C. Samples: Color selections for polyester powder coat finish.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Products from other qualified manufacturers having a minimum of 5 years experience manufacturing ornamental picket fencing will be acceptable by the architect as equal if they meet the following specifications for design, size, gauge of metal parts and fabrication (or equal).
- B. Ornamental Picket Fence and Swing Gates:
Style: Monumental Iron Works Imperial B-3 Horizontal Rails, or approved equal.
Heights: 6'0" or as otherwise indicated on the Drawings.
- C. Approved Manufacturers:
1. Monumental Iron Works, Baltimore, MD,
Phone (888) MH-Fence, (888) 643-3623

2. Ameristar, Tulsa, OK
Phone (888) 333-3422
3. Merchant Metals
Phone (770) 741-0300
211 Perimeter Way, Suite 250
Atlanta, GA 30346
4. LOCINOX USA.
Phone (877) 562-4669
460 Windy Point Drive
Glendale Heights, IL 60139

2.02 ORNAMENTAL PICKET FENCE

- A. Pickets: Square tubular members, ASTM A513, hot-rolled structural quality steel. 50,000 psi (310 Mpa) tensile strength, 60,000 psi (372 Mpa) yield strength. Minimum size pickets $\frac{3}{4}$ inches square x 16 ga. Space pickets 3-15/16" maximum (100mm) face to face. Attach each picket to each rail with $\frac{1}{4}$ " (6mm) industrial drive rivets. Size #4. Minimum gauge wall thickness solid gauge.
- B. Rails: "U" channels formed from hot-rolled structural steel having no pockets or shelves to hold water or moisture, 1-3/8" (35 mm) wide x 1-1/2" (38 mm) deep, 11-gauge (0.120" (3.05 mm) wall thickness. Punch rails to receive pickets and rivets and attach rails to rail brackets with 2 each, $\frac{1}{4}$ " (6 mm) industrial drive rivets. Size #4. Steel for rail produced under ASTM A446. Provide top rail, bottom rail, and third rail 6" below top rail.
- C. Posts: Square tubular members, ASTM A500, hot-rolled structural quality steel, 50,000 psi (310 Mpa) Tensile strength, 60,000 psi (372 Mpa) yield strength, with ASTM A525 hot-dipped galvanized G90 coating. Minimum post size 4" sq., having minimum 12-gauge wall thickness. Post size at gates as required to support specified gate leaf size. Posts at all gates to receive LOCINOX hardware shall be between .2 inches and .313 inches thick.
- D. Accessories: post caps.
- E. Finish: After all steel components have been galvanized, clean and prepare the surface of all components to assure complete adhesion of finish coat. Apply 2.5 mil (0.0635) thickness of polyester resin-based powder coating by electrostatic spray process. Bake finish for 20 minutes at 450°C (232°C) metal temperature. Color as selected by Architect from manufacturer's full range of standard colors.

2.03 GATES

- A. Ornamental picket swing gates in same style configuration and height as specified fencing.
- B. Gate posts shall be of extra heavy-duty construction and size to adequately support each specified gate leaf size without sag.
- C. Provide panic hardware at non-vehicular gates.

D. Gate Hardware

1. See drawings for gate elevations and hardware groups.
2. Self-Closing Hinge System – LOCINOX USA – Mammoth-HD 180 Degree Closer and Hinge Kit for accessible gates up to 440 lbs. Opening force shall be less than 5 lbs. For use at all accessible required gates along path of travel or along egress route with panic devices. Provide manufacturer's optional mounting hardware for thicker gate post material.
3. ~~Heavy Duty Hinges: At maintenance/fire access gates, provide heavy duty weld hinges of size capable of supporting specified leaf width without sag or failure. Gorilla hinge or equal.~~

2.04 ~~VEHICLE TRAFFIC GATES~~

- A. ~~Manually operated, horizontal sliding traffic gate to be single leaf in same style configuration and height to match specified fencing.~~
- B. ~~Gate posts/guide posts shall be of extra heavy duty construction and size to adequately support each specified gate leaf size without sag or vibration.~~
- C. ~~Use only manufacture's heavy duty components including heavy duty roller guides, stops, locking clasps, v track and wheel assemblies. Provide locking clasp capable of receiving padlock for rolling gate in closed position. V track shall be set in concrete curb flush with traffic surface.~~

2.05 ACCESSORIES

- A. Rail Attachment Brackets – Monumental Iron Works Pro-Arc swivel bracket with up to 30 degree swivel (up/down/left/right) or approved equal). Bracket to fully encapsulate rail end for complete security that is aesthetically pleasing. Note to Bidder: District has standardized on this specific bracket and requires it to be used regardless of which fence panel manufacture is submitted on. Bid accordingly.
- B. Industrial Drive Rivets: Of sufficient length to attach items in a secure non-rattling position. Rivet to have a minimum of 1100 lbs. (4894 N) holding power and a shear strength of 1500 lbs. (6674 N).
- C. Ornamental Picket Fence Accessories: Provide indicated items required to complete fence system. Galvanize each ferrous metal item in accordance with ASTM B695 and finish to match framing.
- D. Post Caps: Formed steel, cast of malleable iron or aluminum alloy, weathertight closure cap. Provide one flat style post cap for each post.
- E. Picket Tops: Flat top with polymer plug.
- F. ~~Hinges: Provide heavy duty weld hinges of size capable of supporting specified leaf width without sag or failure. Gorilla hinge or equal.~~
- G. ~~Locking Clasps: Provide heavy duty hardware to receive padlock at location where gate leaves meet each other or strike post.~~

- H. ~~Padlocks: Padlocks are provided by District. Contractor to provide necessary padlock quantity to District. Once provided by Owner, Contractor shall re-key to match specific site keying.~~
- I. ~~Cane Bolt: Provide heavy duty cane bolt at all 2-leaf gate configurations. Provide at each leaf to secure each leaf into pavement below. Cane bolt shall be capable of being raised and locked in the retracted position when not in use. Provide 12 inch galvanized sleeve receivers encased with 12 inch round concrete in the close and open position. Cane bolts to freely drop and lift in the closed and open position.~~
- J. ~~Knox Box: Model 3200 series, black. Fully weld to gate frame. Prime and paint affected finish. Location and quantity as shown on drawings. Boxes located at frontage of school shall have a reflective red adhesive sticker on front of lock body. Boxes located at other locations not on main school frontage shall have a reflective green adhesive sticker on front of lock body.~~
- K. ~~Knox Locks: Model 3700 series, stainless steel, exterior use. Provide at all maintenance gates and fire apparatus gates along fire lane. All locks shall have a reflective green adhesive sticker around lock body.~~

2.06 SETTING MATERIAL

- A. Concrete: Minimum 28-day compressive strength of 3,000 psi.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify areas to receive fencing are completed to final grades and elevations.
- B. Ensure property lines and legal boundaries of work are clearly established.

3.02 INSTALLATION

- A. Install fence in accordance with manufacturer's instructions.
- B. Space posts uniformly not to exceed a full panel width. Face of post to closest picket not to exceed 3-7/8 inch spacing.
- C. Concrete Fence Set Posts: 32" min. \varnothing x48" min. deep or as otherwise indicated on drawings.
- D. Concrete Gate Swing Posts: Provide reinforced concrete footings as indicated on the Drawings.
- E. Check each post for vertical and top alignment and maintain in position during placement and finishing operation.
- F. Align fence panels between posts. Firmly attach rail brackets to posts with 1/4" (6 mm) bolt and lock nut, ensuring panels and posts remain plumb.
- G. Position bottom of picket 2 inches above existing/new finished grade. Distance from picket on each end

of panel to the support post shall not be greater than 4”.

- H. Where touch up paint is necessary, paint shall match powder coated finish. Unacceptable finishes will require re-powder coating.
- I. Cutting of manufacturer’s brackets will not be accepted.

3.03 GATE INSTALLATION

- A. Install gates plumb, level and secure for full opening without interference.
- B. Attach hardware by means, which will prevent unauthorized removal.
- C. Adjust hardware for smooth operation.
- D. All gates with panic hardware to be third-party shop fabricated in a certified shop along with adjacent posts and header. Galvanized and powder coated finishes.
- E. At gates with LOCINOX closer, Install hinge and closer per manufacturer’s recommendations. Provide required backing inside steel gate and post. Install using only manufacturer's provided hardware.
- F. Welding: All welds shall be shop fabricated prior to galvanizing unless otherwise acceptable to Owner’s representative. And all field welds shall be completed by a Certified Structural Welder and shall be “spray-galvanized” or otherwise treated subject to the discretion of the Owner’s Representative.
 - 1. All field welding to be performed by a certified welder and all welds are to be ground down smooth.
 - 2. All areas of welds are to be thoroughly cleaned and treated with two coats of cold galvanized spray.
 - 3. All maintenance-type hinges shall be welded to the gate post.
- G. ~~At rolling gate, install in full accordance with manufacturer's written instructions. Provide new V-track guide rail set in new concrete curb strip cut in flush with drive surface.~~

3.04 ACCESSORIES

- A. Install post caps and other accessories to complete fence. Post caps shall be riveted to post with two rivets on opposite sides of post.

3.05 CLEANING

- A. Clean up debris and unused material and remove from site.

~~3.06 ADDITIONAL SUPPLIED ITEMS~~

- ~~A. Provide a bag of rivets to District.~~
- ~~B. Provide (4) additional 10 feet long 4 inch square tubing posts.~~

~~C. Provide twenty additional brackets to District.~~

END OF SECTION 32 31 19