Bid 23-13

ORANGE COUNTY DEPARTMENT OF EDUCATION

CONSTRUCTION MANUAL

SUNBURST YOUTH ACADEMY – BUILDING 25N

4022 SARATOGA AVE #25
LOS ALAMITOS, CA 90720

MARCH 2024

GHATAODE BANNON ARCHITECTS, LLP
760 W 16th Street - Unit B
Costa Mesa, CA 92627
P: (714) 665-8030
F: (714) 665-8029

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ARCHITECT

GHATAODE BANNON ARCHITECTS, LLP
760 W. 16th Street, Unit B
Costa Mesa, CA 92627
P: (714) 665-8030
F: (714) 665-8029

License: _____
Sushila Ghataode
C-28923 Exp. November 30, 2024

PLUMBING AND MECHANICAL ENGINEER

POCOCK DESIGN SOLUTIONS
14451 Chambers Road, Suite 210
Tustin, CA 92780
P: (949) 417-3903

License: _____
Andrew R Gossman
M-35839 Exp. March 31, 2024

ELECTRICAL ENGINEER

AG DESIGN INC.
2100 W Orangewood Avenue, Suite 165
Orange, CA 92868
P: (949) 769-9900

License: _____
Adam Sloan
E-18589 Exp. December 31, 2024

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SECTION 02 41 00 - SELECTIVE DEMOLITION

PART 1 - GENERAL

A. Removal of designated building equipment and fixtures.
B. Removal of designated construction.
C. Disposal of materials.
D. Storage of salvaged materials.
E. Cap and identify utilities.
F. Temporary partitions to allow building occupancy.
G. Temporary fire protection.
H. Schedule of materials and equipment.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged.

B. Disposal: Removal off-site of demolition waste and subsequently deposit in landfill acceptable to authorities having jurisdiction.

C. Existing to Remain: Items of construction that are not to be removed and that are not shown to be removed.

1.3 MATERIALS OWNERSHIP

A. Historic items, relics, cornerstones, commemorative plaques, tablets and similar objects encountered during demolition are to remain the Owner's property.

B. Carefully remove each item in a manner to prevent damage and deliver to Owner.

1.4 SUBMITTALS

A. Predemolition Photographs: Show conditions of exiting adjacent construction and site improvements that might be misconstrued as damaged by demolition operations. Submit before work begins.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable codes for demolition work, safety of structure, electrical disconnection and reconnection dust control and disposal of materials.

B. Comply with California Fire Code (CFC), California Code of Regulations, (CCR) Title 24, Part 9, Chapter 14 - Fire Safety During Construction and Demolition.

C. Obtain required permits from authorities.

D. Notify affected utility companies before starting work and follow their requirements.

E. Do not close or obstruct egress width to exits.

F. Do not disable or disrupt building fire or life safety systems without 3-day prior written notice to the Owner.

1.6 PROJECT CONDITIONS

A. Areas of buildings to be demolished will be evacuated and their use stopped before the start of work.

B. Owner will occupy building(s) next to demolition area. Conduct demolition so the owner's operation will not be disrupted.

C. Provide at least 72-hour notice to Owner of activities that will affect Owner's operation.

D. Keep access to existing walkways, exits and other adjacent occupied facilities.

E. Owner assumes no responsibility for areas of buildings to be demolished.

F. Hazardous Materials: It is not expected that hazardous materials will be encountered in the work.

1. Hazardous materials will be removed by Owner before start of work.

2. Hazardous materials will be removed by Owner under separate contract.

3. If materials suspected of containing hazardous materials are encountered, do not disturb them. Notify Architect.

4. Conform to applicable regulatory procedures when discovering hazardous or contaminated materials.

1.7 SEQUENCING

A. Owner will conduct salvage operations before demolition begins to remove materials and equipment that the Owner chooses to keep.

B. Let Owner know in writing 5 days in advance of any required work to be performed on a weekend or holiday.

C. Coordinate utility and building service interruptions with Owner.

D. Schedule tie-ins to existing systems to minimize disruption.

E. Coordinate Work to ensure fire sprinklers, fire alarms, smoke detectors, emergency lighting, exit signs and other life safety systems remain in full operation in occupied areas.

1.9 PROJECT CONDITIONS

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Cease operations at once if the structure is in danger and notify the Architect. Do not resume operations until directed.

3. PART 3 - EXECUTION

3.1 EXAMINATION

A. Correlate existing conditions with requirements shown.

B. Inventory and record condition of items to be removed and salvaged. Execute pre-demolition photographs.

D. Verify that hazardous waste remediation is complete.

3.2 PREPARATION

A. Existing Utilities: Find, identify, disconnect and seal or cap off indicated utilities serving areas to be demolished.

B. Salvaged Items: Clean, pack and identify items for delivery to Owner.

C. Protect existing items which are not shown to be salvaged, removed, or altered.

D. Erect and maintain weatherproof closures for exterior openings.

E. Erect and maintain temporary partitions to prevent the spread of dust, fumes, noise, and smoke to provide for Owner occupancy.

3.3 DEMOLITION

A. Conduct demolition to minimize interference with adjacent [and occupied] building areas.

B. Cease operations at once if the structure is in danger. Notify Architect. Do not resume operations until directed.

C. Maintain protected egress and access to the Work.

D. Maintain fire safety during demolition per CFC, Chapter 14.

E. Demolish in an orderly and careful manner. Protect existing supporting structural members.

3.4 SALVAGING OF DEMOLITION MATERIALS

A. Clean salvaged items.

B. Pack or crate items after cleaning. Identify contents.

C. Store items in secure area until delivery to Owner.

D. Protect items from damage.

E. Install salvaged items to follow requirements for new materials and equipment.

3.5 RECYCLING OF DEMOLITION MATERIALS

A. Separate recycled demolition materials from other demolished materials.

B. Stockpile processed materials on-site without intermixing with other materials.

C. Do not store materials within drip line of trees

D. Transport recyclable materials that are not shown to be reused off Owner's property to recycling receiver or processor.

E. Recycled incentives received for building demolition materials shall be equally shared between Contractor and Owner.

F. Wood Materials: Sort and stack members according to size, type and length. Separate dimensional and engineered lumber, panel products, and treated wood materials.

G. Metals: Separate by metal type. Remove nuts, bolts and rough hardware. Sort structural steel by type and size.

H. Roofing: Separate organic and fiberglass shingles and felts. Remove nails, staples and accessories.

I. Doors and Hardware: Brace open end of door frames. Leave hardware attached to doors.

J. Carpet and Pad: Store clean dry carpet and pad in a closed container or trailer.

K. Gypsum Board: Stack large clean pieces on pallets. Remove edge trim and sort with metals. Remove and dispose of fasteners.

L. Acoustical Ceiling Materials: Stack panels and tiles on pallets. Separate suspension system and sort with metals.

M. Equipment: Drain tanks, piping and fixtures. Seal openings with caps or plugs.

N. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves and other components.

O. Lighting Fixtures: Remove lamps and separate by type.

P. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

Q. Conduit: Reduce conduit to straight lengths and store by type and size.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Except for items to be salvaged, reinstalled, or otherwise shown to remain, remove demolished materials from Project site and legally dispose of them in an EPA – approved landfill.

B. Do not burn or bury materials on site.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt and debris caused by demolition.

B. Remove temporary construction.

C. Return adjacent areas to condition existing before demolition operations began.

D. Leave the site in a clean condition.

END OF SECTION 02 41 19

SECTION 07 90 10 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Preconstruction Joint Sealant-Substrate Tests: Submit substrate materials representative of actual joint surfaces to joint sealant manufacturer for laboratory testing of joint sealants for adhesion to primed and unprimed substrates and for compatibility with joint substrates and other joint-related materials.

B. Submittals: In addition to product data submit the following:

1. Samples of each type and color of joint sealant required.
2. Certified test reports for joint sealants evidencing compliance with requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under service and application conditions, as demonstrated by testing and field experience.

B. Colors: Provide color indicated of exposed joint sealants or, if not otherwise indicated, as selected by Owners Representative from manufacturer's standard colors.

C. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated complying with ASTM C 920 requirements.

1. “Use” definitions:

a. Use “T” : Joint in traffic areas.
b. Use “NT” : Joint in nontraffic areas.
c. Use “M” : Sealant tested on mortar.
d. Use “G” : Sealant tested on glass.
e. Use “A” : Sealant tested on aluminum.
f. Use “O” : Sealant tested on substrates on than above standards.

2. Sealant No. 1: Multi-component Polyurethane Sealant; Type M; Grade NS; Class 25, Uses NT, M, A, O.

a. Provide one of the following products:

1) Dymeric: Tremco, Inc.,
2) Dynatrol II: Pecora Corp.,
3) Permapol RC-2: Products Research & Chemical Corp.,
4) Or equal.

3. Sealant No. 2: One-component Polyurethane Sealant; Type S; Grade NS; Class 25, Uses NT, M, A, O.

a. Provide one of the following products:

1) Dymeric: Tremco, Inc.,
2) Dynatrol I: Pecora Corp.,
3) Permapol RC-1: Products Research & Chemical Corp.,
4) Or equal.

4. Sealant No. 3: Silicone rubber based one-part non-acid curing sealant; Type S; Grade NS; Class 25, Uses NT, G, A, O.

a. Provide one of the following products:

1) Dow Corning 790; Dow Corning Corp.,
2) Rhodorsil 5C; Rhone-Pouleng Inc.,
3) Silpruf SCS 2000; General Electric,
4) Spectrum 2; Tremco,
5) Or equal.

5. Sealant No. 4: Acrylic terpolymer, solvent based, one-part, thermoplastic sealant compound;; Type S; Grade NS; Uses NT, M, A, O; recommended by manufacturer for general use as an exposed building construction sealant.

a. Provide one of the following products:

1) One Part Acrylic; Dap Inc.,
2) Mono; Tremco, Inc.,
3) 60+ Unicrylic; Pecora Corp.,
4) Or equal.

6. Sealant No. 5: Two-component Polyurethane Sealant; Type M; Grade P; Class 25, Use T.

a. Provide one of the following products:

1) N.R. - 200 Urexpan; Pecora Corp.
2) Sonolastic Paving Joint Sealant; Sonneborn,
3) THC-900; Tremco, Inc.,
4) Or equal.

7. Sealant No. 6: Butyl Rubber Sealant; solvent-based with minimum 75% solids, non-sag consistency, tack-free time of 24 hours or less, paintable, non-staining; complying with FS TT-S-001657.

a. Provide one of the following products:

1) BC-158 Butyl Rubber; Pecora Corp.,
2) Butly Flex; Dap, Inc.,
3) Tremco Butyl Sealant; Tremco, Inc.
4) Or equal.

8. Sealant No. 7: Mildew-Resistant One-Part Silicone Rubber Sealant; Type S; Grade NS; Class 25, Uses NT, A, O; compounded specifically for mildew resistance and recommended by manufacturer for interior joints in wet areas; passing ANSI A136.1 test for mold growth.

a. Provide one of the following products:

1) Tremco Proglaze; Tremco, Inc.,
2) Dow Corning 786: Dow Corning Corp.,
3) Silicone Sanitary 1702 Sealant; General Electric Co.,
4) Or equal.

9. Compressible Joint Filler: Manufacturer's standard open-cell, flexible foam strip of polyurethane or other weather resistant foam, saturated with butylene or other nondrying liquid sealant/adhesive, to a formulation which will form a paintable watertight joint at 50% compression, without staining, migrating, hardening or other performance failure.

a. Sandell Mfg. Co. APoly-tite@, (617) 491-0540,
b. Or equal (no known equal).

10. Sealant Backings, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

a. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonwaxing, nonextruding strips of plastic foam of material indicated below, and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

1) Open-cell polyurethane foam.
2) Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
3) Proprietary, reticulated, closed-cell polymeric foam, nonoutgassing, with a density of 2.5 pcf and tensile strength of 35 psi per ASTM D 1623, and with water absorption less than 0.02 gram/cubic centimeter per ASTM C 1083.
4) Any material indicated above.

b. Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to -26 deg F (-32 deg C).
c. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing bond between sealant and joint filler or other materials at back of joint.

11. Primer: As recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

B. Preparation

1. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:

    a. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
    b. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
    c. Remove laitance and form release agents from concrete.
    d. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

2. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
3. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

C. Installation of Joint Sealants:

1. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
2. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
3. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
4. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

    a. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

        1) Do not leave gaps between ends of joint fillers.
        2) Do not stretch, twist, puncture, or tear joint fillers.
        3) Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.

    b. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.

5. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths

that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

6. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

   a. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

D. Cleaning: Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

E. Protection: Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that and installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 90 10

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.

B. Related Requirements:

1. Section 05 50 00 "Metal Fabrication" for non-structural steel framing and suspension systems that support gypsum board panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Product Data: For adhesives and sealants, indicating VOC content.
3. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.
4. Laboratory Test Reports: For ceiling and wall materials, indicating compliance with requirements for low-emitting materials.
5. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

B. All materials shall be delivered in original bundles bearing the brand name, if any; applicable standard designation; and name of the manufacturer or supplier for whom the product is manufactured.

1. The plastic packaging used to wrap gypsum panel products for rail and/or truck shipment is intended to provide temporary protection from moisture exposure during transit only and is not intended to provide protection during storage after delivery. Such plastic packaging shall be removed immediately upon receipt of the shipment.

a. Failure to remove protective plastic shipping covers can result in condensation which can lead to damage, including mold.

C. All materials shall be kept dry. Gypsum panel products shall be neatly stacked flat with care taken to prevent sagging or damage to edges, ends, and surfaces.

1. Gypsum panel products and accessories shall be properly supported on a level platform, and fully protected from weather, direct sunlight exposure, and condensation.

D. Gypsum panel products shall be protected from elements before, during, after construction

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

1. Gypsum panels installed in areas that are not enclosed and conditioned shall have fiberglass mat laminated to both sides and manufacturer's 12 month exposure warranty.

C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with applicable provisions in CBC Chapter 25.

B. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

C. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1. Exterior Wall STC Rating: Not less than 50 unless otherwise indicated.
2. Interior Wall STC Rating: Not less than 40 unless otherwise indicated.

2.2 REGULATORY REQUIREMENTS

A. All insulation provided for use on this project shall be identified as required by Section 12-13-1557 of the California Referenced Standards Code (Part 12, Title 24, C.C.R.); Chapter 12-13 "Standards For Insulating Material", (See Part 6, Title 24, C.C.R.); Department Of Consumer Affairs, Bureau of Home Furnishings and Thermal Insulation; Article 3: "Standards for Insulating Material".

2.3 SUSTAINABILITY REQUIREMENTS

A. Comply with applicable provisions in the CGBC.

B. Recycled Content of Steel Products: Recycled content not less than 20 percent.

C. Recycled Content of Gypsum Panel Products: Recycled content not less than 20 percent by weight.

D. Thermal Insulation, Tier 1: Comply with the following standards per CGBC Section A5.504.4.8:

1. Chapters 12-13 (Standards for Insulating Material) in Title 24, Part 12, the California Referenced Standards Code.
2. The VOC-emission limits defined in 2009 CHPS criteria and listed in its High Performance Products Database.
3. California Department of Public Health 2010 Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as Specification 01350).

E. Thermal Insulation, Tier 2: Thermal insulation, No-added Formaldehyde. Install thermal insulation which complies with Tier 1 plus does not contain any added formaldehyde per CGBC Section A5.504.4.8.1.

F. Provide glass-fiber blanket insulation as follows:

1. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05 ppm formaldehyde.
2. Recycled Content: Recycled content not less than 20 percent.

G. Provide mineral-wool blanket insulation as follows:

1. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05 ppm formaldehyde.
2. Recycled Content: Recycled content not less than 20 percent.

H. Regional Materials: Gypsum panel products shall be manufactured within 500 miles (800 km) of Project site.

I. Finish Material Pollutant Control: Finish materials shall comply with CGBC Sections 5.504.4.1 through 5.504.4.6 per CGBC Section 5.504.4.

1. Adhesives, Sealants, and Caulks: Adhesives, sealants, and caulks used on the project shall meet the requirements of the following standards per CGBC Section 5.504.4.1:

a. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in CBC Tables 5.504.4.1 and 5.504.4.2. Such products also shall comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene), except for aerosol products specified in subparagraph below.
b. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

2. Adhesives shall comply with maximum VOC limits listed in CGBC Table 5.504.4.1.

J. VOC Content: Adhesives shall comply with the following VOC limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Drywall and Panel Adhesives: 50 g/L.

K. Low-Emitting Adhesives: Adhesives shall comply with the requirements of authorities having jurisdiction.

L. Low-Emitting Materials: Gypsum board wall, ceiling, and soffit assemblies shall comply with the requirements of authorities having jurisdiction.

M. Interior Sound Transmission: Wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public spaces shall have an STC of at least 40 per CGBC Section 5.507.4.3.

2.4 STEEL SUSPENDED CEILING AND SOFFIT FRAMING

A. General: Provide and install a suspended gypsum board ceiling assembly equal to Chicago Metallic Series #650 per ICC ESR-2631 with an overall framing depth of 1½". Provide a heavy-duty system in accordance with ASTM C635.

B. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.

C. Hanger Attachments to Concrete:

1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching hanger wires as indicated on plans.

2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other devices for attaching hangers of type indicated on plans.

D. Vertical Hanger Wires: Class 1 zinc coated (galvanized) carbon steel conforming to ASTM A 641. Wire shall be #9 gage (0.148" dia.) with soft temper and minimum tensile strength=70ksi.

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch (1.37 mm), a minimum 1/2-inch- (12.7-mm-) wide flange, with ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized zinc coating.

1. Depth: 1-1/2 inches.

F. Furring Channels (Furring Members): Commercial-steel sheet with ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized] zinc coating.

1. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22.2 mm) deep.

a. Minimum Base Metal Thickness: 0.0179 inch (0.45 mm)

2.5 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C 1396/C 1396M.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Gypsum.
b. CertainTeed Corporation.
c. Continental Building Products, LLC.
d. Georgia-Pacific Gypsum LLC.
e. National Gypsum Company.
f. PABCO Gypsum.
g. USG Corporation.

2. Thickness: 1/2 inch (12.7 mm).

3. Long Edges: Tapered.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M. UL Classification: ULIX.

1. Basis-of-Design Product: Subject to compliance with requirements, provide United States Gypsum Company; USG Sheetrock Brand, EcoSmart Panels, Firecode X, or a comparable product by one of the following:

a. American Gypsum.
b. CertainTeed Corporation.
c. Continental Building Products, LLC.
d. Georgia-Pacific Building Products.
e. National Gypsum Company.
f. PABCO Gypsum.
g. Temple-Inland Building Products by Georgia-Pacific.

2. ISO 14040 Environmental Management, Life Cycle Assessment, Principles and Framework:

a. Carbon emissions limit per Gypsum Association; Industry Standard Type III EPD for North American Type X wallboard with a manufacturing Global Warming Potential of 225 kg CO2 / 1000 sq ft.
b. Water reduction per Gypsum Association; Industry Standard Type III EPD for North American Type X wallboard having a manufacturing Virtual Water of 1.0 cu m / 1000 sq ft.
c. Primary energy from non-renewable resources 3997 MJ / 1000 sq ft.

3. UL Type Designation: ULIX.
4. ASTM E 136 Non-Combustibility: Meets or exceeds criteria.
5. ASTM E 84 Surface-Burning Characteristics:

a. Flame Spread: 15.
b. Smoke Developed: 5.
c. Classification: Class A.

6. ASTM C 473:

a. Core Hardness: Meets or exceeds 11 (ASTM C 473 B).
b. Flexural Strength:

1) Parallel: Not less than 46 lb ft.
2) Perpendicular: Not less than 147 lb ft.

c. Nail Pull Resistance ASTM C 473 B: Not less than 87 lb ft.

7. Thickness: 5/8 inch (15.9 mm).
8. Weight: 1.75 to 1.85 lb / sq ft.
9. Long Edges: Tapered.

C. Abuse-Resistant Gypsum Board: ASTM C 1396/C 1396M gypsum board, tested according to ASTM C 1629/C 1629M.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. American Gypsum.
    b. CertainTeed Corporation.
    c. Continental Building Products, LLC.
    d. Georgia-Pacific Building Products.
    e. National Gypsum Company.
    f. PABCO Gypsum.
    g. Temple-Inland Building Products by Georgia-Pacific.
    h. USG Corporation.

2. Core: 5/8 inch (15.9 mm), Type X.
3. Surface Abrasion: ASTM C 1629/C 1629M, meets or exceeds Level 2 requirements in corridors and Level 3 requirements in gymnasiums and locker rooms.
4. Indentation: ASTM C 1629/C 1629M, meets or exceeds Level 2 requirements in corridors and Level 3 requirements in gymnasiums and locker rooms.
5. Soft-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 2 requirements in corridors and Level 3 requirements in gymnasiums and locker rooms.
6. Long Edges: Tapered.
7. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

D. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. American Gypsum.
    b. CertainTeed Corporation.
    c. Continental Building Products, LLC.
    d. Georgia-Pacific Building Products.
    e. National Gypsum Company.
    f. PABCO Gypsum.
    g. Temple-Inland Building Products by Georgia-Pacific.
    h. United States Gypsum Company.

2. Core: 5/8 inch (15.9 mm), Type X.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.6 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. L-Bead: L-shaped; exposed long flange receives joint compound.
d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
e. Expansion (control) joint.
f. Curved-Edge Cornerbead: With notched or flexible flanges.

2.7 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.

2.8 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

D. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: As specified in Section 07 92 19 "Acoustical Joint Sealants."

F. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

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

3.2 INSTALLING STEEL FRAMING, GENERAL

A. Installation Standards: ASTM C 754, and ASTM C 840 requirements that apply to framing installation.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."

C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.

1. Isolate ceiling assemblies where they abut or are penetrated by building structure.
2. Isolate partition framing and wall furring where it abuts structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assembly and laterally support assembly.

    a. Use deep-leg deflection track where indicated.

D. Do not bridge building control and expansion joints with steel framing or furring members. Frame both sides of joints independently.

3.3 INSTALLING STEEL SUSPENDED CEILING AND SOFFIT FRAMING

A. Suspend ceiling hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
4. Secure rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not support ceilings directly from permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
6. Do not attach hangers to steel deck tabs.
7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

B. Installation Tolerances: Install steel framing components for suspended ceilings so members for panel attachment are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member and transversely between parallel members.

C. Wire-tie furring channels to supports.

D. Install suspended steel framing components in sizes and spacings indicated, but not less than that required by the referenced steel framing and installation standards.

1. Hangers: 48 inches (1219 mm) o.c.
2. Carrying Channels (Main Runners): 48 inches (1219 mm o.c.
3. Furring Channels (Furring Members): 24 inches (610 mm) o.c.

E. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.4 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place

tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4 to 3/8 inch (6.4 to 9.5 mm) wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4 to 1/2 inch (6.4 to 12.7 mm) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.5 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Wallboard Type: As substrate for acoustical tile and where indicated on Drawings.
2. Type X: Unless otherwise indicated.
3. Abuse-Resistant Type: Where indicated on Drawings.
4. Mold-Resistant Type: Where indicated on Drawings.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) or horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, not less than 16 inches (400 mm), from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners, unless otherwise indicated or required by fire-resistance-rated assembly.

D. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12 inch (300 mm) long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches (400 mm) o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches (300 mm) o.c.

3.6 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints at locations indicated on Drawings or, if not indicated, according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.

2. LC-Bead: Use at exposed panel edges unless otherwise indicated.
3. L-Bead: Use where indicated.
4. U-Bead: Use where indicated.
5. Curved-Edge Cornerbead: Use at curved openings.

3.7 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 3: At panel surfaces that will not be exposed to view such as those in mechanical and electrical rooms, panel surfaces that are substrate for plastic paneling (FRP) and acoustical tile, and where indicated on Drawings.

    a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."

3. Level 4: At panel surfaces that are substrate for wall coverings and panel surfaces that will be exposed to view unless otherwise indicated.

    a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."

3.8 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for interior ceilings.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:

1. Acoustical Panels: Set of not less than 6 inch (150 mm) square Samples of each type, color, pattern, and texture.

2. Exposed Suspension-System Members, Moldings, and Trim: Set of not less than 6 inch (150 mm) long Samples of each type, finish, and color.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension-system members.

2. Structural members to which suspension systems will be attached.

3. Method of attaching hangers to building structure.

a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.

5. Size and location of initial access modules for acoustical panels.

6. Items penetrating finished ceiling and ceiling-mounted items including, but not limited to, the following:
    a. Lighting fixtures.
    b. Diffusers.
    c. Grilles.
    d. Speakers.
    e. Sprinklers.
    f. Access panels.
    g. Perimeter moldings.
7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.
8. Minimum Drawing Scale: 1/8 inch = 1 foot (1:96).

B. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.

C. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size panels equal to 5 percent of quantity installed.
2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and stabilize moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.11 WARRANTY

A. Special Warranty: Manufacturer and Installer agree to repair or replace acoustical panels and suspension system components that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Acoustical panel failures include, but are not limited to, the following:

a. Visible sag, mold/mildew growth, and bacterial growth.

2. Suspension system component failures include, but are not limited to, the following:

a. Red rust.

3. Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings from an applicable testing agency.

1. Flame-Spread Index: Class A according to ASTM E 1264. Not more than 25.

2. Smoke-Developed Index: Not more than 50.

2.3 SUSTAINABILITY REQUIREMENTS

A. Recycled Content of Steel Products: Recycled content not less than 20 percent.

B. Recycled Content of Acoustical Panels: Recycled content not less than 20 percent.

C. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

D. Low-Emitting Materials: Acoustical panel ceilings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the

Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 ACOUSTICAL PANELS, GENERAL

A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface according to ASTM E 795.

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.5 ACOUSTICAL PANELS [**ACT-1**]

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc; School Zone® Fine Fissured, Square Lay-In, Medium Texture, Item Number 1714, or a comparable product by another manufacturer.

B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Classification: Provide panels as follows:

1. Type and Form: Type III, mineral base with painted finish; Form 2, water felted.

2. Pattern: C E (perforated, small holes and lightly textured).

D. Color: White.

E. Light Reflectance (LR): Not less than 0.8.

F. Ceiling Attenuation Class (CAC): Not less than 40.

G. Noise Reduction Coefficient (NRC): Not less than 0.70.

H. Edge/Joint Detail: Square.

I. Thickness: 3/4 inch (19 mm).

J. Modular Size: 24 by 48 inches (610 by 1220 mm).

K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.6 ACOUSTICAL PANELS [ACT-2]

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc; Calla® Vector, Smooth Texture, Item #2815, or a comparable product by another manufacturer.

B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Classification: Provide panels as follows:

1. Type and Form: Type IV, wet-formed mineral base with painted finish; Form 2.

2. Pattern: E; Fire Class A.

D. Color: Custom, as selected by Architect.

E. Light Reflectance (LR): Not less than 0.85.

F. Ceiling Attenuation Class (CAC): Not less than 33.

G. Noise Reduction Coefficient (NRC): Not less than 0.80.

H. Edge/Joint Detail: Vector.

I. Thickness: 1-inch (25 mm).

J. Modular Size: 24 by 48 inches (610 by 1220 mm).

K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.7 METAL SUSPENSION SYSTEM

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc, Product Evaluation Report ICC-ES ESR-1308. Main Runner: Prelude® XL® 15/16-inch Heavy-Duty Exposed Tee System #17301. Cross Runner: Heavy-Duty XL7340.

B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.

C. Heavy-duty, Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; pre-painted, electrolytically zinc coated, or hot-dip galvanized, according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation; with prefinished 15/16 inch (24 mm) wide metal caps on flanges.

1. Structural Classification: Heavy-duty system.

2. End Condition of Cross Runners: Override (stepped) type.

3. Face Design: Flat, flush.

4. Cap Material: Cold-rolled steel.

5. Cap Finish: Painted white.

2.8 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

a. Type: Cast-in-place or post-installed expansion anchors.

b. Corrosion Protection: Carbon-steel components zinc plated according to ASTM B 633, Class SC 1 (mild) service condition.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than #12 gage (0.106" diameter) with soft temper and minimum tensile strength = 70 ksi.

C. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces, or as shown on Drawings.

D. Beam End Retaining Clips:

1. Fixed End: Subject to compliance with requirements, provide Armstrong World Industries; BERC, Beam End Retaining Clips, or a comparable product by another manufacturer. Clips shall be used to join main beams and cross tees to wall molding without the need for exposed fasteners.

a. Ceiling system may be attached to no more than two adjacent walls.

2. Free End: Subject to compliance with requirements, provide Armstrong World Industries; BERC2, 2-inch Beam End Retaining Clips. Clips shall be used to join main beams and cross tees to wall molding, allowing for seismic movement, without the need for stabilizer bars.

2.9 METAL EDGE MOLDINGS AND TRIM

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc; Prelude® XL® 15/16 inch Exposed Tee System, Wall Molding Item Number 7800, or a comparable product by another manufacturer.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.

2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.10 PERIMETER INDIRECT LIGHT COVES (CLOUD)

A. Basis of Design Product/Manufacturer: Axiom® Indirect Light Coves; Armstrong World Industries, Inc.

B. System: An extruded aluminum light cove system fully concealed integrated design to create a light cove profile (without integrated light fixture). Commercial quality extruded aluminum alloy 6063 trim channel, factory finished in baked polyester paint (custom) color. Commercial quality aluminum unfinished t-bar connection clips; galvanized steel splice plates.

C. Components:

1. Axiom® Indirect Light Cove Systems: Aluminum extrusions factory attached to formed sheet aluminum with a distinct architectural detail grove for compatible lighting fixtures. Special bosses are designed to connect AXTBC T-bar connector clip and splice plate; to provide positive mechanical lock with no visible fasteners. Factory finished matching approved samples.

2. Axiom® Indirect Light Cove Straight sections:

a. Axiom Indirect Ceiling to Ceiling Light Coves, Classic Edge Detail
1) AXIDLCC41418 – 18" Indirect Ceiling to Ceiling Classic

3. Axiom® Indirect Light Cove Corners, each corner is factory finished and sided to accommodate the straight section of the axiom indirect light cove.

a. Axiom Indirect Ceiling to Ceiling Light Coves, Classic Edge Detail
1) AXIDLCC41418OC – 18" Indirect Ceiling to Ceiling Classic, Outside Corner , custom angle refer to drawing.

4. Axiom® Indirect Light Cove Accessories

a. AXTBC – T-Bar Connector Clip (for use with Classic Axiom Trim)

b. AX4SPLICE – Axiom splice Plate

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

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

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated and comply with layout shown on reflected ceiling plans.

B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

A. Install acoustical panel ceilings according to ASTM C 636/C 636M, seismic design requirements, and manufacturer's written instructions.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.

2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.

3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.

4. Secure wire hangers to ceiling-suspension members and to supports above with not less than four tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts or post-installed mechanical anchors that extend through forms into concrete.

6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.

7. Do not attach hangers to steel deck tabs.

8. Do not attach hangers to steel roof deck unless otherwise indicated. Attach hangers to structural members.

9. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.

10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Secure bracing wires to ceiling suspension members and to supports with not less than four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place hanger inserts or post-installed mechanical anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends. Miter corners accurately and connect securely.

3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install beam end retaining clips in accordance with manufacturer's instructions.

G. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.

1. Arrange directionally patterned acoustical panels as follows:

a. As indicated on reflected ceiling plans.

2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.

3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.

B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no panels have been installed. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.

3.6 Within each test area, testing agency will select one of every 10 post-installed mechanical anchors used to attach hangers to wood roof framing and will test them for 200 lbf (890 N) of tension; it will also select one of every two post-installed mechanical anchors used to attach bracing wires to wood roof framing and will test them for 440 lbf (1957 N) of tension.

1. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

B. Acoustical panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.7 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Thermoset-rubber base.
2. Rubber molding accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Product Data: For sealants, indicating VOC content.
4. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
5. Laboratory Test Reports: For resilient base and stair products and accessories, indicating compliance with requirements for low-emitting materials.

C. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches (300 mm) long.

D. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.6 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 SUSTAINABILITY REQUIREMENTS

A. Comply with applicable provisions in the CGBC.

B. Finish Material Pollutant Control: Finish materials shall comply with CGBC Sections 5.504.4.1 through 5.504.4.6 per CGBC Section 5.504.4.

1. Adhesives, Sealants, and Caulks: Adhesives, sealants, and caulks used on the project shall meet the requirements of the following standards per CGBC Section 5.504.4.1:

a. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in CBC Tables 5.504.4.1 and 5.504.4.2. Such products also shall comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene), except for aerosol products specified in subparagraph below.

b. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

2. Adhesives shall comply with maximum VOC limits listed in CGBC Table 5.504.4.1.
3. Resilient Flooring Systems: For 80 percent of floor area receiving resilient flooring, installed resilient flooring shall meet at least one of the following per CGBC Section 5.504.4.6:

a. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program.
b. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010.
c. Compliant with the Collaborative for High Performance Schools California (CA-CHPS) Criteria Interpretation for EQ 7.0 and EQ 7.1 (formerly EQ 2.2) dated July 2012 and listed in the CHPS High Performance Product Database.
d. Products certified under UL GREENGUARD Gold (formerly the Greenguard Children's and Schools Program).

C. VOC Content: Adhesives shall comply with the following VOC limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Rubber Floor Adhesives: 60 g/L.
2. VCT and Asphalt Tile Adhesives: 50 g/L.
3. Cove Base Adhesives: 50 g/L.

D. Low-Emitting Materials: Adhesives shall comply with the requirements of authorities having jurisdiction.

E. Low-Emitting Materials: Flooring systems shall comply with the requirements of authorities having jurisdiction.

2.2 THERMOSET- OR THERMOPLASTIC-RUBBER BASE

A. Thermoset-Rubber Base:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Burke Mercer Flooring Products; a division of Burke Industries Inc.
b. Flexco.
c. Johnsonite; a Tarkett company.
d. Roppe Corporation, USA.

2. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).

a. Style and Location:

1) Style A, Straight: Provide in areas with carpet and carpet tile.
2) Style B, Cove: Provide unless otherwise indicated.

3. Thickness: 0.125 inch (3.2 mm).
4. Height: 4 inches (102 mm) unless otherwise indicated.
5. Lengths: Coils in manufacturer's standard length.
6. Outside Corners: Preformed.
7. Inside Corners: Job formed or preformed.
8. Color: Black.

2.3 RUBBER MOLDING ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Roppe Corporation, USA.
2. VPI Corporation.

B. Description: Rubber nosing for carpet, nosing for resilient flooring, reducer strip for resilient flooring, joiner for resilient flooring and carpet, joiner for tile and carpet, and transition strips. Also, includes stair nosings (top and bottom of each interior stair run, typical).

C. Profile and Dimensions: As indicated on Drawings.

D. Locations: Provide rubber molding accessories where two distinct types of flooring meet and are not separated by a threshold and where indicated on Drawings.

E. Color: Black.

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

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

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths if practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.

a. Miter or cope corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 65 13

SECTION 09 65 23 - LUXURY VINYL TILE [OFCI]

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Luxury vinyl tile flooring as indicated.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 09 65 13 - Rubber Base.

3. Section 09 68 16 – Sheet Carpeting

1.02 DEFINITIONS

A. Pop-up: A pop-up is defined as any surface deviation or looseness of substrate that is equal to or greater than 1/64 (0.015625) inch above the concrete floor level, regardless of the size.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's published technical data describing materials, construction and recommended installation instructions. Submit technical data and installation instructions for each adhesive material. Submit list and Product Data of recommended finish materials.

B. Maintenance Instructions: Submit manufacturer's recommendations for maintenance, care, and cleaning of luxury vinyl tile.

C. Samples: Submit Samples of luxury vinyl tile and any reducers or transitions in each available color and pattern. Following color selections, submit full size samples of each selected color and pattern. Submit pint cans of each type of adhesive.

D. Maintenance Materials: Before Substantial Completion, deliver one unopened container of each color and pattern of luxury vinyl tile in each color and pattern installed. Label each container indicating locations installed. Include unopened cans of adhesives adequate to install the maintenance materials.

E. Installer's Experience Qualifications: Submit list of not less than five projects, extending over period of not less than five years, indicating installer's experience record. Submit letter from manufacturer indicating manufacturer's approval for installer of the products.

1.04 QUALITY ASSURANCE

A. Qualifications of Installer: Minimum five years' experience in successfully installing the same or similar flooring materials.

B. Qualifications of Supervising Installer: In addition to the qualifications of the installer listed above, the flooring installer's supervisor shall have a minimum of 10 hours Cal-OSHA safety training.

C. Pre-Installation and Progress meetings: Prior to start of work of this section and after approval of submittals, schedule on-site meetings between Contractor, Supervising Installer, Owner's representative to review installation and procedures required for project.

D. Comply with the following as a minimum requirement:

1. Materials shall be compliant with requirements of CBC Chapter 11B and ADAAG.

2. ASTM E84: Class A Flame Spread Rating of 25 or less.

3. Comply with current CHPS requirements, www.chps.net.

4. Moisture Testing: ASTM F1869 and ASTM F2170.

1.05 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to the Project site in original unopened manufacturer's packaging clearly labeled with manufacturer's name.

B. Materials shall be stored at room temperature, but not less than 70 degrees F for not less than 48 hours before installation, unless manufacturer's instructions specify otherwise.

1.06 PROJECT CONDITIONS

A. Ventilation and Temperature: Verify areas that are to receive new flooring are ventilated to remove fumes from installation materials. Verify that areas are within temperature range recommended by the various material manufactures for Project site installation conditions.

1.07 WARRANTY

A. Manufacturer shall provide a fifteen (15) year material defect warranty.

B. Installer shall provide a five-year fabrication and installation warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Bentley Mills, Inc.

B. Tandus Centiva

C. InterfaceFLOR

D. Or equal.

2.02 MATERIALS

A. Basis of Design: Products as manufactured by Bentley Mills, Inc., 4641 Don Julian Road, City of Industry CA 91746

1. Provide "Ground Rules" Luxury Solid Vinyl Tile, style number: BGRRUL648V.

a. Tile Size: 6 in (15.24 cm) (w) x 48 in (121.9 cm) (l).

b. Gauge Total Thickness: 5 mm.

c. Wear Layer Thickness: 20 mil.

d. Install Type: Glue Down.

e. Maintenance: Inherent No Wax Surface.

f. Classification: ASTM F1700, Class III Type B.

g. Dimensional Stability: ASTM F2199, ≤ 0.02 in (0.5 mm).

h. Indoor Air Quality: FloorScore™ Certified.

B. Crack Filler and Leveling Compound: 100 percent cementitious binder type (as defined by ASTM C150). Acceptable manufacturers:

1. Webcrete #95 as manufactured by Durabond.

2. Ardex SD-F.

3. Armstrong S184.

4. Equal, as recommended by flooring manufacturer.

5. Leveling Compound shall meet or exceed 200 pounds when tested in accordance with ASTM C 1583.

C. Concrete Primer: Non-staining type recommended by manufacturer of luxury vinyl tile.

D. Adhesive: Water based, low odor type formulated specially for installation with luxury vinyl tile, recommended by manufacturer.

E. Reducer Strips: Tapered rubber not less than one inch wide, and thickness to match tile.

PART 3 - EXECUTION

3.02 COORDINATION

A. Coordinate with related Work to assure level, dry, smooth, and clean finish surfaces to receive luxury vinyl floor tile.

3.03 EXAMINATION

A. Field verify and correct deficiencies of conditions affecting Work before commencing Work of this section.

3.04 PREPARATION OF CONCRETE SLABS

A. Do not start preparation until underlying concrete floor slabs are at least 90 days old. Any leveling compound under a vapor or moisture barrier shall be warranted to be installed in a wet or moist environment without moisture limitations.

B. Leveling: Check sub-floors for true to level and plane within the tolerance listed in Manufacturer's installation instructions. Test floor areas both ways with a 10-foot straightedge and repair high and low areas exceeding allowable tolerance. Pop ups shall be hammered out and floor filled with an approved cementitious leveling compound. Remove high areas by power sanding, stone rubbing or grinding, chipping off and filling with an approved leveling compound, or equivalent method. Fill low areas with an approved leveling compound. Repair and level surfaces having abrupt changes in plane, such as trowel marks or ridges, whether or not within allowable tolerance. Clean areas where repairs are performed.

C. Cracks or Depressions: Fill voids with an approved cementitious leveling compound of the type recommended by flooring manufacturer for the specific Work conditions.

D. Cleaning: After leveling, clean substrates of deleterious substances and foreign matter.

3.06 INSTALLATION OF TILE

A. Color and pattern: Install tiles in the pattern indicated on Drawings. If no pattern is indicated, tiles shall be installed in a rectangular pattern, in one color.

B. Install luxury vinyl floor tile when ambient temperature is 70 degrees F or higher or manufacturer's range.

C. Install the tile adhesive in a thin film evenly with a notched trowel. Trowel notches shall be as recommended by adhesive manufacturer.

1. Mix adhesive in accordance with manufacturer's instructions.

2. Install adhesive only in area that can be covered by flooring material within the adhesive manufacture's recommended working time. Adhesive application rate shall be required to avoid telegraphing trowel lines to the surface after maintenance coatings are applied. Adjust tile runoff during installation if necessary.

3. Immediately remove any excess adhesive from the tile surface using the adhesive manufacturer's recommended cleaner and a damp, not wet, cloth.

D. Provide reducer where floor covering edges are exposed, such as at center of the door or where floor coverings terminate.

E. Install tiles symmetrically about centerlines of areas progressing toward walls. Adjust border tiles to be even on all walls or nothing smaller than a 3" piece. Tiles shall be straight and joints close. Tile shall be cut to fit snug door jambs casing, pipes fixtures and walls. No slivers at edges.

F. Mechanically cut flooring material to produce square true edges.

G. As floor tile is installed and within adhesive's recommended working time, roll with a clean, smooth, 100-pound roller in both directions. As the rolling proceeds, replace any loosened, defective, or damaged tile with new and finish to the specified condition.

H. Remove dust, debris, and soil with any combination of sweeping, micro-fiber dust-mopping with a properly treated, non-oily mop and vacuuming.

3.07 CLEANING, NO WAXING, AND COMPLETION

A. Maintain flooring surfaces clean as installation progresses.

B. Use a sprayer to mist the area to be cleaned with a neutral cleaning solution prepared in accordance with manufacturer's instructions.

C. Gently scrub the floor using red or maroon cleaning, not stripping pads, mounted on a single disc, 175 RPM floor machine; or preferably, with a machine that uses horizontally mounted brushes with a counter-rotating spindle motion. Never allow the machine to remain running stationary.

D. Remove the resulting slurry with a wet vacuum.

E. Rinse the floor at least four times, each time using a clean mop and clean rinse water. On the first rinse, apply just enough water to keep the floor wet until the solution is picked-up with a vacuum. The next two rinses should be with a well wrung-out, damp mop. The final rinse should produce virtually clean rinse water. Ensure the rinse water is clean throughout the rinsing process. Avoid tracking the floor after the final rinse. Check the floor after the final rinse for any missed areas and re-scrub/rinse as needed. Repeat the rinsing process until all signs of the cleaning solution are removed and the floor shows no sign of haziness or dusting when dry. If the Contractor has lightweight "automatic" floor machines capable of achieving the same result as described above, they may be used in-place of this method. Do not flood or excessively dampen floor at any time.

F. Allow the Work to dry thoroughly.

G. Clean adjacent baseboard and other surfaces of adhesive and other materials. Replace damaged or defective Work to the specified condition.

3.08 CLEAN UP

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

3.09 PROTECTION

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

END OF SECTION

SECTION 09 68 16 – SHEET CARPETING [OFCI]

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Installation of owner-furnished carpeting.

B. Related Requirements:

1. 09 65 13Resilient Base and Accessories, for resilient wall base and accessories installed with carpet.

PART 2 - PRODUCTS [OWNER-FURNISHED]

PART 3 - EXECUTION

3.1 BASICS

A. Bentley Mills has adopted the carpet and Rug institute's "standard for installation of commercial carpet," (cRi 104) as the basic minimum industry guideline for the installation of Bentley Mills carpet. Please note, the instructions for some specific styles may exceed the basic minimum requirements set forth in the CRI 104 Standard. When consulting the cRi 104, please make certain it is the most recent edition and contains the latest updates. copies may be obtained on the cRi website (www.carpet-rug.org).

1. Layout

a. Carpet seams will never be completely invisible and are usually most visible the days following the initial installation. Seams become less visible with routine vacuuming and foot traffic.

b. Note: Bentley's EliteFlex 6 ft Cushion and EliteFlex 6 ft Hardback require no pattern matching.

3.2 FLOOR PREPARATION

A. Concrete Subfloor

1. All new concrete must be fully cured, clean, and dry. old concrete must be clean, dry, level, and free of paint, dirt, old adhesive, oils, or other contaminates. the concrete should be free of curing or parting agents that interfere with the bonding of the adhesive. Whenever a powdery surface is encountered, such as lightweight concrete, a sealer compatible with the adhesive, such as taylor 2025 Primer, must be used to provide a suitable surface for a direct glue installation.

2. Level the floor to the standards outlined in the American Concrete Institute specifications for Concrete Building ACI 301 in regards to trowel finish and finishing tolerance. Leveling compounds must be Portland-based cement. Patch cracks and holes with one of the following approved patching compounds: Ardex Feather Finish, Ardex K-15, Henry's 547, Mapei Plani Patch mixed with Plus additive or similar cementitious based compound. Do not exceed manufacturer's recommendation for patch thickness. Gypsum based compounds are not recommended.

   a. Note: Incompatible adhesives, solvent-based materials, and other contaminates should be removed 85-90% and encapsulated with Taylor Zephyr prior to installation of carpet. Contact Bentley Mills for further information at 800.423.4709.

B. Concrete Moisture

1. Healthbond 2399 adhesive (EliteFlex 6 ft Cushion and EliteFlex 6 ft hardback)

   a. Up to 100% RH - No testing required.

   b. No pH testing required.

   c. No verifiable intact moisture vapor retarder required.

2. Healthbond 1000 adhesive (EliteFlex 6 ft Cushion only)

   a. 95% RH maximum - Testing required.

   b. 9 pH maximum - Testing required.

C. Other Substrates

1. Underlayment grade osB, APA registered underlayment plywood, Gypsum or lightweight concrete must be primed with taylor 2025 primer.

D. Test Conditions

1. Testing is not required when using Bentley Healthbond 2399 adhesive. No RH testing, no pH testing, no intact moisture vapor retarder required.

   a. Note: Hydrostatic pressure is not an acceptable condition of the substrate. Hydrostatic pressure is the occurrence of the concrete slab being hydrated from below or water under the slab pushing up through the surface. This is visually seeing effervescence or alkaline salts carried with water on the surface of concrete and occurs with "on grade" or "below grade" concrete.

3.3 INSTALLATION INSTRUCTIONS

A. Conditioning Carpet

1. The carpet should be allowed to acclimate in the anticipated installation space for a minimum of 24 to 48 hours prior to installation. The amount of time necessary for conditioning will depend upon potential temperature extremes during storage. Carpet subject to extreme temperature fluctuations will require more acclimation time than carpet stored in a climate-controlled building. During periods of high humidity more time may be required to allow the carpet to acclimate. Water-based adhesives may need more time to flash off prior to placing carpet onto the adhesive.

B. Seam Cutting

1. Bentley Mills goes to great lengths to determine the appropriate products to be offered with the EliteFlex backing option. EliteFlex backing options require the same general installation methods and recommendations. Most EliteFlex seams require a slight serpentine double cut seam, however, some styles require a straight double cut seam in an effort to reduce possible visual discrepancies with the face yarn. Verification of product seaming method is the responsibility of the dealer/installer. For any questions, please contact Bentley Mills at 800.423.4709.

   a. EliteFlex 6 ft Cushion and EliteFlex 6 ft hardback

      1) Recommended seam cutting tool - National Carpet Equipment #575 Commercial Seam Cutter or equivalent.

      2) Installations utilizing a wet set adhesive requires the seams to be dry cut.

      3) Overlap the selvage edges 2″ to allow sufficient material to be cut.

      4) With firm and continuous pressure, cut both breadths of material in a slight serpentine double cut resulting in 18-24″ wave repeat; the blade should be sharp and lightly touch the subfloor.

      5) All EliteFlex products should use the slight serpentine double cut method, with the exception of the following products which require a straight double cut for best seam appearance:
         a) **Allegro** (straight cut only)
         b) **Backstage** (straight cut only)
         c) **Interlude** (straight cut only)

C. Seam Sealing

1. EliteFlex 6 ft Cushion

   a. Remove both top and bottom strips of carpet and properly edge/seam seal only with Bentley PermaWeld Premium seam sealer.

   b. Apply a continuous 1/8″ bead of seam sealer to the cut edge on one side only in sufficient quantity to seal both trimmed edges and to cover the primary and cushion backing without contaminating face yarns.

   c. Immediately place the edge of the second piece of carpet into contact with the first piece which has the seam sealer on it. To achieve a good bond, it is essential for the two pieces of carpet to have a tight fit.

   d. Traffic on the seam should be restricted for 12 hours.

2. EliteFlex 6 ft hardback

a. EliteFlex 6 ft Hardback does not require seam sealing

D. Adhesive and Adhesive Application

1. Once the floor has been properly prepared as detailed in CRI 104, a full spread method of adhesive is required to install both EliteFlex Hardback and EliteFlex Cushion carpet. Full spread means that the entire area to receive carpet should be covered. Healthbond 2399 Pressure Sensitive Adhesive and Healthbond 1000 Multi-purpose Adhesive are specifically designed for interior installation of Bentley carpet. These adhesives can be applied using common tools and techniques over a variety of porous and non-porous surfaces.

a. Healthbond 2399 Pressure sensitive adhesive (EliteFlex 6 ft Cushion and EliteFlex 6 ft hardback)

1) Up to 100% RH- No testing required.

2) No pH testing required.

3) No verifiable intact moisture vapor retarder required.

4) Full Spread
a) Apply with:
b) 1/2″ nap paint roller (33 sy/gal spread rate) or
c) 1/16″ X 1/32″ X 1/32″ U notch trowel (24-28 sy/gal spread rate)
d) Allow adhesive to flash 100%.
e) Roll with a 75-100 pound roller to ensure proper adhesion.

5) Traffic should be restricted for 12 hours after installation.

b. Healthbond 1000 Multi-purpose adhesive (EliteFlex 6 ft Cushion ONLY)

1) 95% RH maximum - Testing required.

2) 9 pH maximum - Testing required.

3) dry cut seams prior to applying adhesive

4) Full Spread
a) Apply with:
b) 1/16″ x 1/16″ x 1/16″ square notch trowel (16 sy/gal spread rate)
c) Wet set installation method.
d) Roll with a maximum 35 pound roller to ensure proper adhesion.

5) Traffic should be restricted for 12 hours after installation

E. Important Advice

1. These installation procedures are recommendations designed for the experienced and competent installer. Strict adherence to these procedures will result in a quality installation under most conditions. Any situation that could alter the installation procedure or jeopardize the possibility of a satisfactory installation, such as identification of defective material or unusual installation conditions, creates a responsibility for the installer to STOP the installation immediately and call Bentley Mills customer care at 800.423.4709. Bentley Mills will not be responsible for substandard installation or for an installer's decision to proceed with an installation that is not resulting in a satisfactory or acceptable finished installation.

F. Contact Us

1. Bentley Mills, Inc. 14641 East Don Julian Road, City of Industry, California 91746 800.423.4709 | bentleymills.com

SUPPLEMENTAL LABOR CONDITIONS
Owner Supplied / Contractor Installed Projects

I. Carpet material is to be Bentley "EliteFlex". Backing material is 6 ft cushion.

II. Carpet material and Rough Idea matting are to be supplied by the owner (school district).

III. Bidding contractors will be responsible for:

A. All other items needed for a completed job shall be provided by the contractor such as wall base, reducers, floor sundries, patching material, etc.

B. Plan take-off, proper estimates for yardage, material and labor needed to complete job. Contractor will be held responsible to the original estimate.

C. Seam diagrams for all applications except 12' x 12' VAT tile.

D. Supplying all materials with the exception of the carpet material and Rough Idea matting.

E. Contractor is required to be certified by CPI for the installation of EliteFlex backing systems. Every installer on the job must carry a current certification card indicating his or her personal name. Also, the contractor must have a letter from CPI stating that the award winning flooring contractor meets all certification requirements. This letter must be part of the bid submittal package.

F. Contractor will be required to receive owner supplied materials at the contractor's warehouse 6-8 weeks prior to the scheduled installation date. Contractor must have adequate warehouse and storage facilities.

G. Contractor must provide warehouse facilities that are adequate to store carpet and matting material. Warehouse facilities must be insured and bonded. Certification will be required showing that the carpet material is insured for 100% of its value. Contractor must supply insurance for all district owned stored material.

H. The contractor will be responsible for all flooring sundries and floor preparation materials.

I. The contractor will be responsible for all flooring preparation labor. Contractor's price is to include two man-hours per hundred square yards for floor prep.

J. The contractor will be responsible for all proper equipment to receive and deliver material to the job sites.

K. The contractor will be responsible for all deliveries of all district owned and contractor stored materials to all job sites. This includes all projects designated within the bid document.

L. The contractor will be responsible for insuring the district owned material when delivering and transporting goods.

M. The contractor will be responsible for all wall base material and installation.

N. The contractor will be responsible for providing reducers/transition materials that utilize an aluminum track and snap down system.

O. The contractor will be responsible for following the manufacturer's installation instructions exactly for all materials utilized.

IV. Carpet material will have varying dye lots based on project size.

V. Carpet material will be installed over several different substrates to include: wood, VAT and concrete. Contractors will be responsible for contacting the manufacturer for the correct installation specifications for each substrate application.

VI. If applicable, contractor will be responsible for the removal and disposal of existing carpet where new carpet will be installed.

VII. Contractor must have available resources to meet a minimum of 107 yards of installation per day and a maximum of 1,070 yards per day. Labor requirements vary on a daily basis.

VIII. In addition to receiving and storing district supplied materials the contractor may be required to pick up owner supplied materials at designated loading docks in La Mirada and/or Anaheim, California at no additional cost to the district.

IX. Contractor will be responsible for storing all owner supplied material for the term of the contract at no charge to the District. All carpet overages or waste exceeding the size of 6′ x 10′ shall be labeled and stored by the contractor. Remaining materials will be delivered to the District when requested or at termination of contract.

X. All warranties must be submitted with payment requests in order to process payment. Warranties shall indicate site, location, room number, purchase order number, contract number and date of installation.

XI. Contractor shall be responsible for the labor and warranty it for 10 years non-prorated. The 10-year labor warranty is to read as follows: contractor has been responsible for the application of materials, materials have been installed per manufacturer specifications and they meet the integrity level set forth by the manufacturer. This includes proper application of wall base, thresholding, carpet, sheet vinyl, VCT/HVT and any other flooring materials contracted.

XII. Contractor is responsible for identifying any inherent abnormalities relating to manufacturer supplied products such as carpet, tile, adhesive, etc. The District must be notified prior to installation in the case where materials may compromise the proper application of flooring.

XIII. Contractor shall ensure that wall base, thresholding and carpet applications are installed correctly per plan specifications and manufacturer's recommendations.

XIV. The District may require concrete vapor emission testing. Contractor will utilize calcium chloride tests. The cost of calcium chloride tests shall not exceed $40.00 per test. Each test must include pH results.

XV. Contractor will give a minimum of 3 days notice prior to any installation schedule changes.

XVI. No change orders or additional payments will be considered unless approved by district personnel.

XVII. Material Acclimation:

A. Materials must be acclimated at least 24 hours prior to installation. This would include adhesives and seam weld. Please note that materials need to stand on end during acclimation.

XVIII. Seam weld:

A. All seams must be properly welded utilizing manufacturer approved seam weld.

END OF SECTION

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on interior substrates listed in Part 3, 3.6 Interior Painting Schedule.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 1 to 2 units at 85 degrees.

B. Gloss Level 2: 5 to 9 units at 60 degrees and 10 to 15 units at 85 degrees.

C. Gloss Level 3: 10 to 15 units at 60 degrees and 15 to 30 units at 85 degrees.

D. Gloss Level 4: 20 to 35 units at 60 degrees and 35 to 50 units at 85 degrees.

E. Gloss Level 5: 40 to 50 units at 60 degrees.

F. Gloss Level 6: 70 to 80 units at 60 degrees.

G. Gloss Level 7: More than 80 units at 60 degrees.

H. Blocking: Two painted surfaces sticking together such as a painted door sticking to a painted jamb.

I. Mildew Resistant: Certified products are specially formulated with microbicidal additives that resist mold, mildew and algae growth on the paint film and inhibit growth of bacterial odors.

J. CHPS: Collaborative for High Performance Schools. A national movement to improve student performance and the entire educational experience by building the best possible schools. www.chps.net.

K. EG: Ethylene Glycol. Ethylene glycol is listed as a hazardous air pollutant (HAP) by the U.S. EPA.

L. PDCA: Painting & Decorating Contractors of America. www.pdca.org .

M. RAVOC: Reactivity adjusted VOC. "Reactivity" means the ability of a VOC to promote ozone formation.

N. SSPC: The Society for Protective Coatings publishes Scopes of SSPC Surface Preparation Standards and Specifications. www.sspc.org .

O. Dunn-Edwards Conformance Chart : DE CONFORMANCE TABLE

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit samples on rigid backing, no smaller than 7 inches X 10 inches (177 mm X 254 mm) or larger than 8.5 inches X 11 inches (216 mm X 280 mm).
2. Label each Sample for project, architect, general contractor, painting contractor, paint color name and number, paint brand name, "P" number if applicable, and application area.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, [from the same product run,] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: Provide not less than 1 gal. (3.8 L) of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 90 deg. F (10 and 32 deg. C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

C. Painting contractor should follow proper painting practices and exercise judgment based on his or her experience and project specific conditions as to when to proceed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Provide products listed from the Dunn-Edwards Corporation.

B. Other Acceptable Manufacturers:

1. Sherwin Williams

2. Frazee Paints and Wall coverings

3. Vista Paints

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another, and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

C. Colorants: The use of colorants containing hazardous chemicals, such as ethylene glycol, is prohibited and zero VOC colorants should be used whenever possible.

D. Colors: As selected by the Architect.

1. Indicate a percentage of surface area which will be painted with deep tones.

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner may engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint

materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will comply with requirements to use compatible products and systems as described in Article 2.2. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.
5. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smoothly.

D. Plaster Substrates: Verify that plaster is fully cured, including pH testing to determine that alkalinity is within limits established by the manufacturer.

E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

G. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions.

B. Remove hardware, covers, plates, and comparable items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions, including pH testing to determine that alkalinity is within limits established by the manufacturer.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

G. Shop Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop primed surfaces.

H. Galvanized Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

L. Doors/Door Frames:
1. Wood and metal surfaces shall be washed with TSP (tri-sodium phosphate) substitute to remove dirt, grease and other foreign materials and rinsed with clean water and then sand papered and dusted off.
2. Checked, cracked, blistered, scaled, peeling, and alligatored paint on wood and metal surfaces shall have paint removed down to original finished surface, then hand-sanded and dusted clean.
   a. Surfaces shall then be considered as new work.
   b. Woodwork shall be hand sanded smoothly after every coat, except last coat. Coats shall be free from dust, dirt or other imperfections.
3. Painted or refinished interior and exterior wood or metal doors must be finished on both sides and edges with three coats of paint.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

D. Block Fillers: Provide block fill as scheduled to conform to the following PDCA Standard P12-05:

1. Level 3 - Premium Fill: One or multiple coats of high-performance block filler manufactured to be applied at a high dry film build. Block filler shall be backrolled to eliminate voids and reduce most of the masonry profile depth.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in occupied spaces:
   a. Uninsulated metal piping.

b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Metal conduit.
e. Plastic conduit.
f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
g. Other items as directed by the Architect.

2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by the Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer, alkali resistant, waterbased, interior/exterior Dunn-Edwards, Eff-Stop Select ESSL00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).

B. CMU Substrates:

1. Premium Low Odor/VOC Latex System:

a. Block Filler: Block filler, latex, interior/exterior, Dunn-Edwards, Smooth Blocfil Select SBSL00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, Dunn-Edwards, Spartazero SZRO10, (Gloss
d. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).

C. Steel Substrates:

1. Premium Low Odor/VOC Latex over a Waterborne Alkyd Primer System:

a. Prime Coat: Primer, rust inhibitive, waterborne alkyd, interior/exterior Dunn-Edwards, Bloc-Rust Premium BRPR00 Series.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).

2. Waterbased Latex Dry Fall System:

a. Topcoat: Dry fall, waterbased, interior, flat, Dunn-Edwards, Aquafall AQUA10 (Gloss Level 1).

D. Galvanized Metal Substrates:

1. Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer, waterbased, interior/exterior, Dunn-Edwards, Ultra-Grip Select UGSL00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).

2. Water Based Dry Fall System:

a. Topcoat: Dry fall, waterbased, interior, flat, Dunn-Edwards, Aquafall AQUA10 (Gloss Level 1).
Or

E. Aluminum (Not Anodized or Otherwise Coated) Substrates:

1. Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer, waterbased, interior/exterior, Dunn-Edwards, Ultra-Grip Select UGSL00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).

F. Wood Substrates:

1. Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer, waterbased, interior/exterior, Dunn-Edwards, Ultra-Grip Select UGSL00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).

G. Gypsum Board Substrates:

1. Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer sealer, latex, interior, Dunn-Edwards, Vinylastic Select VNSL00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).

H. Plaster Substrates:

1. Premium Low Odor/VOC Latex System:

a. Prime Coat: Primer, alkali resistant, waterbased, interior/exterior Dunn-Edwards, Eff-Stop Select ESSL00.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, eggshell, Dunn-Edwards, Spartawall SWLL30, (Gloss Level 3).

END OF SECTION 09 91 23

SECTION 10 11 00 - VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Wall mounted marker boards.
2. Horizontal sliding marker boards and map rail at media wall cabinets.
3. Horizontal sliding marker boards and map rail at science classrooms.
4. Tack boards.

B. Related Requirements:

1. Division 01 - General Requirements.

1.02 SUBMITTALS

A. Shop Drawings: Shop Drawings to indicate gages, profiles, sections of materials, details of construction, hardware, methods of attachment and/or anchoring, as applicable for specified materials.

B. Samples: Submit the following:

1. Three- inch by 5-inch marker board Samples, provide manufacturer's full range of colors.
2. Three- inch by 5-inch sliding tack board Samples, provide manufacturer's full range of colors and patterns.
3. Three- inch by 5-inch sliding bulletin board Samples, provide manufacturer's full range of colors.

C. Product Data: Submit manufacturer's technical data, product specifications, installation instructions, and other pertinent information as applicable for each product or material specified.

D. Test Reports: Submit certified laboratory test reports as applicable to indicate compliance with specified requirements.

1.03 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).

3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).

4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).

5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).

6. 2016 California Energy Code, Part 6, Title 24 CBSC.

7. 2016 California Historical Code, Part 8, Title 24 CBSC.

8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).

9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.

10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.

11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.

12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.

13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.

14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.

15. NFPA 20 - Stationary Pumps, 2016 Edition.

16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.

17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended), 2016 Edition.

18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.

19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.

20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.

21. Americans with Disabilities Act (ADA), Title II.

B. Manufacturer shall have been regularly engaged in the business of manufacturing markerboards for at least five years.

C. Comply with requirements and recommendations of applicable portions of Porcelain Enamel Institute - PEI 2.

1.04 PRODUCT HANDLING

A. Deliver materials to the Project site with manufacturer's labels intact and legible.

B. Protect marker boards before, during and after installation.

C. Comply with manufacturer's instructions for handling and storage of Visual Display Boards.

1.05 JOB CONDITIONS

A. Sequencing, Scheduling:

1. Coordinate with related Work of other sections including gypsum board and tackboards.

2. Do not install markerboards until paint is installed to surfaces concealed behind them.

B. Field measure prior to fabrication to ensure proper fit.

C. General contractor to maintain proper climate before, during and after installation.

1.06 SPECIAL PROJECT WARRANTY

A. Manufacturer shall provide a 50 year material warranty.

B. Submit manufacturer's "Life of Building" warranty, stating that under normal usage and maintenance, and when installed in accordance with manufacturer's instructions and recommendations, Porcelain-on-Steel Markerboards and Chalkboards are guaranteed for the life of the building.

C. Warranty shall cover replacement of defective Porcelain-on-Steel Markerboards and Chalkboards due to
discoloration, excessive fading of color, crazing, cracking or flaking. Warranty does not cover the cost of removal or reinstallation.

1.30 REFERENCES

A. A. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
B. B. ASTM E84 –Test Method for Surface Burning and Characteristics of Building Materials.
C. C. ASTM C540 – GlossTest for Porcelain Enamel Steel (Porcelain Enamel Institute PEI-501).

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Provide visual display boards as manufactured by Platinum Visual Systems™, Corona, California. Tel.: (800)498-2990 Fax: (951)817-9900. Email: info@pvsusa.com. Website: www.pvsusa.com.

B. Equal.

2.02 SYSTEM PERFORMANCE

A. System shall be comprised of factory assembled markerboards, in configurations and sizes indicated on the Drawings or as specified herein.

B. Laminations of panel components shall be by face sheet manufacturer.

2.03 MARKERBOARD AND CHALKBOARD MATERIALS

A. Steel Face Sheets: Writing surface will be Writanium® 28 gauge steel face with porcelain enamel finish fused to the steel sheet using a continuous coil process.
1. Markerboard and Chalkboard surface shall be fused at a temperature of 1450º and 1200º, respectively.
2. The gloss of the writing surface will not increase more than three units when subjected to wearability tests specified in testing procedures for 30 hours.

B. Core Material (Sliding Panels): 1/2" honeycomb.
Core Material (Fixed Back): 1/2" honeycomb.

C. Backing Material: .015" aluminum backing sheet.

D. Metal Trim and Accessories: 6063 aluminum alloy with a T5 temper.

E. Adhesive: As recommended by manufacturer for project conditions.

2.04 COLORED CORK TACKBOARD MATERIALS

A. Face Sheet: Colored cork surface will be 1/4" resilient homogenous tackable linoleum surface consisting of linseed oil, granulated cork, rosin binders and dry pigments calendared onto natural burlap backing. Color shall extend through thickness of material and be self-healing.

B. Core Material: 1/4" medium density fiberboard.

C. Backing Material: .015" aluminum backing sheet.

D. Metal Trim: 6063 aluminum alloy with T5 temper.

E. Adhesive: As recommended by manufacturer for project conditions.

2.05 HORIZONTAL SLIDING UNITS

A. Provide Horizontal Sliding Units with Markerboards, Chalkboards and/or Tackboards for project from manufacturer's WHS Series.

1. Metal trim and accessories: WHS Series aluminum extrusions with clear satin anodized finish.

a. Top Track HS500: One piece top track with integral fascia.

b. Bottom Track HS550: Standard channel bottom track to accept nylon guide.

c. Chalktray CR310: Standard continuous solid chalktray with ribbed section and smoothly curved ends.

d. Map rail MR421: Standard 2" high continuous rail with colored cork insert as follows:

1) End stops: One pair per map rail.

2) Map hooks: One every 2' of map rail.

3) Roller brackets: One pair per map rail.

4) Flag holder: One per room.

2. Sliding Markerboard, Chalkboard and/or Tackboard Panels:

a. Frame CH215: Standard channel frame with 3/4" face.

b. Nylon Rollers: Two per panel up to 4' wide and three per panel up to 8' wide.

c. Nylon Guides: Two per panel up to 4' wide and three per panel up to 8' wide.

d. Finger Pulls: One pair per sliding panel.

3. Fixed Back Markerboard, Chalkboard or Tackboard Panel.

4. Size: As shown on drawings. Field verify to match existing

4. Color: As selected from manufacturer's standard colors.

2.06 FABRICATION

A. Laminate facing sheet and backing sheet to core material under pressure, using manufacturer's recommended adhesive.

B. Provide factory-assembled visual display boards, except where sizes demand partial field assembly.

C. Assemble units in one piece without joints, wherever possible. Where required dimensions exceed maximum panel size available, provide two or more pieces of equal length, as indicated on approved shop drawings. Assemble to verify fit at factory, then disassemble for delivery and final assembly at project site.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install markerboard, trim, map rail and marker tray in accordance with manufacturer's directions. Fasteners for assembly of trim and frame units shall be truss head aluminum or stainless steel self-tapping screws with double cadmium-plated finish.

B. Install panels after finish painting of wall surfaces has been completed and paint is cured. Install panels level, plumb and neatly assembled. Before Substantial Completion, trim shall be cleaned of dirt, finger-marks, and other foreign material.

C. Install panel guides, spacers, and panels at media wall cabinets.

3.02 CLEANUP

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

3.03 PROTECTION

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

END OF SECTION

SECTION 10 21 00 - HDPE TOILET COMPARTMENTS (HINY HIDERS)

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Solid plastic toilet compartments including the following: (Hiny Hiders)
   1. Floor mounted overhead-braced toilet compartments.

1.2 RELATED SECTIONS

A. Section 05 50 00 - Metal Fabrications.

B. Section 06 10 00 - Rough Carpentry.

1.3 REFERENCES

A. ASTM A 666 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

B. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

C. National Fire Protection Association (NFPA) 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

E. United States EPA (Environmental Protection Agency) Registration - Bactericidal Surfaces Registered with the U.S. EPA to Legally Make Claims that these Materials Kill Infectious Bacteria.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Provide layout drawings and installation details with location and type of hardware required.

D. Verification Samples: For each finish product specified, two samples representing actual product, color, and patterns.

E. Sustainable Design Submittals:
   1. Recycled Content: Certify percentages of post-consumer and pre-consumer recycled content.
   2. Regional Materials: Certify distance between manufacturer and Project.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A company regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.

B. Installer Qualifications: A company regularly engaged in installation of products specified in this Section, with a minimum of 5 years experience.

C. Materials: Doors, panels and pilasters, constructed from high density polyethylene (HDPE) resins. Partitions to be fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, nonabsorbent and has a self-lubricating surface that resists marks from pens, pencils, markers and other writing instruments. Cover all plastic components with a protective plastic masking.

D. Performance Requirements:
1. Material Fire Ratings:
a. International Code Council (ICC): Class B.
2. Antimicrobial Touch Surfaces: Hardware touch surfaces shall be manufactured from substrates that are registered with the U.S. EPA to kill specific bacteria tested according to U.S. EPA protocols.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.7 PROJECT CONDITIONS

A. 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.

1.8 WARRANTY

A. Manufacturer guarantees its plastic against breakage, corrosion, and delamination under normal conditions for 25 years from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge. Labor not included in warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Scranton Products, which is located at: 801 E. Corey St.; Scranton, PA 18505; ASD Toll Free Tel: 800-445-5148; Fax: 855-376-6161; Email:request info (info@scrantonproducts.com); Web:https://www.scrantonproducts.com
1. Fabricator: Santana Toilet Partitions.
2. Fabricator: Comtec Toilet Partitions.
3. Fabricator: Capitol Toilet Partitions.

B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 MATERIAL

A. Zinc Aluminum Magnesium and Copper Alloy (Zamac): ASTM B 86.

B. Stainless Steel Castings: ASTM A167, Type 304.

C. Aluminum: ASTM 6463-T5 alloy.

2.3 SOLID PLASTIC TOILET COMPARTMENTS

A. Basis of Design: Hiny Hiders Toilet Partitions as manufactured by and supplied by Scranton Products.
1. Style: Floor mounted overhead-braced toilet compartments.

B. Doors, Panels, and Pilasters: 1 inch (25 mm) thick with all edges rounded to a radius. Mount doors and dividing panels based on height of specified system.
1. Door and Panel Height: 55 inches (1397 mm).
2. Panel Edge: Shiplap.
3. Pilasters: 82 inches (2083 mm) high and fastened to floor.

C. Panel Color:
1. Black paisley.

D. Pilaster Shoes: 3 inches (76 mm), 20 gauge stainless steel. Secured to pilasters with a stainless steel tamper resistant Torx head sex bolt.

E. Headrail: Heavy-duty extruded 6463-T5 alloy aluminum with anti-grip design. Finish to be clear anodized. Fastened to headrail brackets with stainless steel tamper resistant Torx head sex bolt, and fastened at the top of the pilaster with stainless steel tamper resistant Torx head screws.
1. Headrail Brackets: 20 gauge stainless steel with satin finish. Secured to the wall with stainless steel tamper resistant Torx head screws.

F. Wall Brackets:
1. Stainless Steel Brackets: Stainless steel type 201.
2. Brackets are fastened to pilasters with stainless steel tamper resistant Torx head screws and fastened to the panels with stainless steel tamper resistant Torx head sex bolts.
3. Bracket Type: Continuous 54 inches (1372 mm) stainless steel.

G. Door Hardware:
1. Continuous Aluminum Hinge:
a. Length: 54 inches (1372 mm).
2. Door Strike/Keeper: Heavy-duty extruded aluminum 6436-T5 alloy with a bright dip anodized finish. Secured to pilasters with stainless steel tamper resistant Torx head sex bolts. Bumper shall be made of extruded black vinyl.
a. Style: 3 inches (76 mm) stainless steel emergency access.
3. Latch Mechanism: Stainless Steel Slide Bolt Latch and Housing: Heavy-duty stainless steel type 304. The latch and housing to have a bright finish. The slide bolt and button to have a black anodized finish.

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.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Examine areas to receive toilet partitions, screens, and shower compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that affect installation of partitions. Report discrepancies to the architect.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install partitions rigid, straight, plumb, and level manor, with plastic laid out as shown on shop drawings.

C. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 3/8 inch (9.5 mm).

D. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.

E. Finished surfaces shall be cleaned after installation and be left free of imperfections.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 10 21 00

SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Hand dryers.
3. Underlavatory guards.
4. Custodial accessories.

1.3 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Include electrical characteristics.

B. Samples: When requested, provide full size, for each accessory item and for each finish specified to verify design, operation, and finish requirements.

1. Approved full-size Samples will be returned and may be used in the Work.

C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.7 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, visible silver spoilage defects.
2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 OWNER-FURNISHED MATERIALS

A. Owner-Furnished Materials (OFCI):

1. Owner may furnish some or all toilet, bath, and laundry accessories at his option for installation by the Contractor.
2. All Owner-furnished material shall comply with the CBC, the 2010 ADA Standards for Accessible Design, and the requirements of this section.
3. Installation of all Owner-Furnished material shall comply with the CBC, the 2010 ADA Standards for Accessible Design, and the requirements of this section.

2.2 ACCESSIBILITY REQUIREMENTS

A. Comply with applicable provisions in the CBC and the 2010 ADA Standards for Accessible Design.

B. Mirrors: Where mirrors are provided, at least one shall comply with CBC Section 11B-603.3 per CBC Section 11B-213.3.5.

C. Coat Hooks and Shelves: Where coat hooks or shelves are provided in toilet rooms without toilet compartments, at least one of each type shall comply with CBC Section11B-603.4. Where coat hooks or shelves are provided in toilet compartments, at least one of each type complying with CBC Section11B-604.8.3 shall be provided in toilet compartments required to comply with CBC Section 11B-213.3.1. Where coat hooks or shelves are provided in bathing facilities, at least one of each type complying with CBC Section11B-603.4 shall serve fixtures required to comply with CBC Section 11B-213.3.6.

D. Protruding Objects:

1. General: Protruding objects shall comply with CBC Section 11B-307 per CBC Section 11B-307.1.
2. Protrusion Limits: Objects with leading edges more than 27 inches (686 mm) and not more than 80 inches (2032 mm) above finish floor or ground shall protrude 4 inches (102 mm) maximum horizontally into the circulation path per CBC Section 11B-307.2 and CBC Figure 11B-307.2.

E. Reach Ranges:

1. General: Reach ranges shall comply with CBC Section 11B-308 per CBC Section 11B-308.1.

F. Operable Parts:

1. General: Operable parts shall comply with CBC Section 11B-309 per CBC Section 11B-309.1.
2. Operation: Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 pounds (22.2 N) maximum per CBC Section 11B-309.4.

G. Toilet and Bathing Rooms:

1. General: Toilet and bathing rooms shall comply with CBC Section 11B-603 per CBC Section 11B-603.1.
2. Mirrors: Mirrors located above lavatories or countertops shall be installed with the bottom edge of the reflecting surface 40 inches (1016 mm) maximum above the finish floor or ground. Mirrors not located above lavatories or countertops shall be installed with the bottom edge of the reflecting surface 35 inches (889 mm) maximum above the finish floor or ground per CBC Section 11B-603.3.
3. Coat Hooks, Shelves, and Medicine Cabinets: Coat hooks shall be located within one of the reach ranges specified in CBC Section 11B-308. Shelves shall be located 40 inches (1016 mm) minimum and 48 inches (1219 mm) maximum above the finish floor. Medicine cabinets shall be located with a useable shelf no higher than 44 inches (1118 mm) maximum above the finish floor per CBC Section 11B-603.4.
4. Accessories: Where towel or sanitary napkin dispensers, waste receptacles, or other accessories are provided in toilet facilities, at least one of each type shall be located on an accessible route. All operable parts, including coin slots, shall be 40 inches (1016 mm) maximum above the finish floor per CBC Section 11B-603.5.

    a. Exception: Baby changing tables are not required to comply with Section 11B-603.5.

H. Water Closets and Toilet Compartments:

1. General: Water closets and toilet compartments shall comply with CBC Sections 11B-604.2 through 11B-604.8 per CBC Section 11B-604.1.
2. Grab Bars for Water Closets: Grab bars for water closets shall comply with CBC Section 11B-609. Grab bars shall be provided on the side wall closest to the water closet and on the rear wall. Where separate grab bars are required on adjacent walls at a common mounting height, an L-shaped grab bar meeting the dimensional requirements of CBC Sections 11B-604.5.1 and 11B-604.5.2 shall be permitted per CBC Section 11B-604.5.

    a. Side Wall: The side wall grab bar shall be 42 inches (1067 mm) long minimum, located 12 inches (305 mm) maximum from the rear wall and extending 54 inches (1372 mm) minimum from the rear wall with the front end positioned 24 inches (610 mm) minimum in front of the water closet per CBC Section 11B-604.5.1 and CBC Figure 11B-604.5.1.
    b. Rear Wall: The rear wall grab bar shall be 36 inches (914 mm) long minimum and extend from the centerline of the water closet 12 inches (305 mm) minimum on one side and 24 inches (610 mm) minimum on the other side per CBC Section 11B-604.5.2 and CBC Figure 11B-604.5.2.

3. Dispensers: Toilet paper dispensers shall comply with CBC Section 11B-309.4 and shall be 7 inches (178 mm) minimum and 9 inches (229 mm) maximum in front of the water closet measured to the centerline of the dispenser. The outlet of the dispenser shall be below the grab bar, 19 inches (483 mm) minimum above the finish floor and shall not be located behind grab bars. Dispensers shall not be of a type that controls delivery or that does not allow continuous paper flow per CBC Section 11B-604.7 and CBC Figure 11B-604.7.

I. Lavatories and Sinks:

1. General: Lavatories and sinks shall comply with CBC Section 11B-606 per CBC Section 11B-606.1.
2. Exposed Pipes and Surfaces: Water supply and drain pipes under lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under lavatories and sinks per CBC Section 11B-606.5.

J. Grab Bars:

1. General: Grab bars in toilet facilities and bathing facilities shall comply with CBC Section 11B-609 per CBC Section 11B-609.1.
2. Cross Section: Grab bars shall have a cross section complying with CBC Section 11B-609.2.1 or 11B-609.2.2 per CBC Section 11B-609.2.

    a. Circular Cross Section: Grab bars with circular cross sections shall have an outside diameter of 1-1/4 inches (32 mm) minimum and 2 inches (51 mm) maximum per CBC Section 11B-609.2.1.
    b. Non-Circular Cross Section: Grab bars with non-circular cross sections shall have a cross-section dimension of 2 inches (51 mm) maximum and a perimeter dimension of 4 inches (102 mm) minimum and 4.8 inches (122 mm) maximum per CBC Section 11B-609.2.2 and CBC Figure 11B-609.2.2.

3. Grab Bars: Spacing: The space between the wall and the grab bar shall be 1-1/2 inches (38 mm). The space between the grab bar and projecting objects below and at the ends shall be 1-1/2 inches (38 mm) minimum. The space between the grab bar and projecting objects above shall be 12 inches (305 mm) minimum per CBC Section 11B-609.3 and CBC Figure 11B-609.3.

   a. Exceptions:

      1) The space between the grab bars and shower controls, shower fittings, and other grab bars above shall be permitted to be 1-1/2 inches (38 mm) minimum.
      2) For L-shaped or U-shaped grab bars complying with CBC Section 11B-609.9 the space between the walls and grab bar shall be 1-1/2 inches (38 mm) minimum for a distance of 6 inches on either side of the inside corner between two adjacent surfaces.

4. Position of Grab Bars: Grab bars shall be installed in a horizontal position, 33 inches (838 mm) minimum and 36 inches (914 mm) maximum above the finish floor measured to the top of the gripping surface, except that at water closets for children's use complying with CBC Section 11B-604.9, grab bars shall be installed in a horizontal position 18 inches (457 mm) minimum and 27 inches (686 mm) maximum above the finish floor measured to the top of the gripping surface. The height of the lower grab bar on the back wall of a bathtub shall comply with CBC Section 11B-607.4.1.1 or 11B-607.4.2.1 per CBC Section 11B-609.4.
5. Surface Hazards: Grab bars and any wall or other surfaces adjacent to grab bars shall be free of sharp or abrasive elements and shall have rounded edges per CBC Section 11B-609.5.
6. Fittings: Grab bars shall not rotate within their fittings per CBC Section 11B-609.6.
7. Installation: Grab bars shall be installed in any manner that provides a gripping surface at the specified locations and that does not obstruct the required clear floor space per CBC Section 11B-609.7.
8. Structural Strength: Allowable stresses shall not be exceeded for materials used when a vertical or horizontal force of 250 pounds (1112 N) is applied at any point on the grab bar, fastener, mounting device, or supporting structure per CBC Section 11B-609.8.
9. Alternate Configuration: L-shaped or U-shaped grab bars shall be permitted per CBC Section 11B-609.9.

K. Toilet tissue dispensers, seat cover dispensers, sanitary-napkin vendors, and sanitary-napkin disposal units located on the grab bar side of an accessible toilet room or stall shall not project more than 3 inches (76.2 mm) from the finished wall surface.

2.3 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.

2.4 SUSTAINABILITY REQUIREMENTS

A. Comply with applicable provisions in the CGBC.

B. Recycled Content of Steel Products: Recycled content not less than 20 percent.

C. Recycled Content of Stainless-Steel Products: Recycled content not less than 20 percent.

2.5 WASHROOM ACCESSORIES

A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.

B. Refer to Toilet Accessories schedule in the drawings for designated accessories and locations.

2.6 UNDERLAVATORY GUARDS

A. Source Limitations: Obtain underlavatory guards from single source from single manufacturer.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Plumberex Specialty Products, Inc.
2. Truebro by IPS Corporation.

C. Underlavatory Guards:

1. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
2. Material and Finish: Antimicrobial, molded plastic, white.

2.7 CUSTODIAL ACCESSORIES

A. Source Limitations: Obtain custodial accessories from single source from single manufacturer.

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:

1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
3. Bradley Corporation.

C. Mop and Broom Holder:

1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc.; Model B-224.

2.8 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.031 inch (0.8 mm) minimum nominal thickness unless otherwise indicated.

B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.

C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036 inch (0.9 mm) minimum nominal thickness.

D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.

E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.9 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide not less than six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mirrors located above lavatories or countertops shall be installed with the bottom edge of the reflecting surface not more than 40 inches (1016 mm) above the finish floor.

B. Mirrors not located above lavatories or countertops shall be installed with the bottom edge of the reflecting surface not more than 35 inches (889 mm) above the finish floor.

C. Where towel dispensers, sanitary napkin dispensers, waste receptacles, or other accessories are provided in toilet facilities, at least one of each type shall be located on an accessible route.

1. All operable parts, including coin slots, shall be not more than 40 inches (1016 mm) above the finish floor.

D. The space between grab bars and projecting objects below and at the ends shall be not less than 1-1/2 inches (32 mm). The space between grab bars and projecting objects above shall be not less than 12 inches (305 mm).

E. Grab Bars: Install to withstand a downward load of not less than 250 lbf (1112 N), when tested according to ASTM F 446. Grab bars shall not rotate within their fittings.

F. Allowable stresses shall not be exceeded for materials used when a vertical or horizontal force of 250 pounds (1112 N) is applied at any point on the grab bar, fastener, mounting device, or supporting structure.

G. Toilet and bath accessories shall not project more than 4 inches (101.6 mm) into the path of travel.

H. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 10 28 00

SECTION 12 36 61.19 QUARTZ SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Quartz agglomerate surfacing countertops.

B. Quartz agglomerate backsplashes.

C. Quartz agglomerate endsplashes.

D. Adhesives and sealants.

1.2 RELATED REQUIREMENTS

A. Section 01 3000 - Submittals.

B. Section 01 7800 - Closeout Submittals.

C. Section 07 9200 - Joint Sealants.

1.3 REFERENCES

A. Reference Standards:

1. ASTM C 97: Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.
2. ASTM C 170: Standard Test Method for Compressive Strength of Dimension Stone.
3. ASTM C 501: Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic tile by the Taber Abraser.
4. ASTM C 834: Standard Specification for Latex Sealants.
5. ASTM C 920: Standard Specification for Elastomeric Joint Sealants.
6. ASTM D 790: Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
7. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials
8. LEED: Leadership in Energy and Environmental Design.
9. NEMA LD-3: High Pressure Decorative Laminates.
10. NSF/ANSI Standard 51: Food Equipment Materials.
11. ISO: International Organization for Standardization.
12. ISO 9001: Quality Management Systems.
13. SCAQMD Rule 1168: Adhesive and Sealant Applications.

14. UL 2818: GREENGUARD Certification Program for Chemical Emissions for Building Materials, Finishes and Furnishings.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 3000 - Submittals.

B. Product Data:

1. Submit product data for each specified product. Include manufacturer's technical data sheets and published instruction instructions.

2. Submit Safety Data Sheets (SDS) for adhesives and sealants.

C. Shop Drawings:

1. Submit fully dimensioned shop drawings showing countertop layouts, backsplashes, endsplashes, joinery, edge conditions, terminations, substrate construction, cutouts and holes. Show plumbing installation provisions. Include elevations, section details, and large-scale details.

D. Samples:

1. Submit selection and verification samples for each color and pattern required.

E. Quality Assurance Submittals:

1. Test Reports: Submit certified test reports showing compliance with specified performance characteristics and physical properties, if required.

2. LEED Submittals: Submit applicable LEED documentation for potential credits specified in this Section.

3. Warranty: Specimen copy of specified warranty.

F. Closeout Submittals:

1. Maintenance Data: Submit manufacturer's published Care & Maintenance manual with closeout submittals.

1.5 REGULATORY REQUIREMENTS

A. Accessibility Requirements: Comply with the U.S. Architectural & Transportation Barriers Compliance Board ADA-ABA Accessibility Guidelines for Buildings and Facilities.

B. Adhesives, Sealants, and Sealant Primers:

1. SCAQMD (South Coast Air Quality Management District) Rule 1168.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturing Facility Qualifications: Quartz surfacing materials produced in an ISO 9001 certified facility.

2. Fabricator Qualifications: Minimum of five years documented experience in fabricating quartz surfacing countertops similar in scope and complexity to this Project, using water-cooled cutting tools. Currently certified by the manufacturer as an acceptable fabricator.

3. Installer Qualifications: Minimum of five years documented installation experience for projects similar in scope and complexity to this Project, and currently certified by the manufacturer as an acceptable installer. [Installer shall be the fabricator].

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Comply with manufacturer's recommendations for shipping and handling quartz surfacing materials to preclude breakage or damage. Brace quartz surfacing units as necessary during shipment, transporting in near-vertical position with finished face towards finished face. Do not allow finished surfaces to rub during shipping and handling.

B. Storage and Protection: Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer. Store quartz surfacing sheet materials on racks in near-vertical position to preclude damage. Store with finished face turned towards finished face. Prevent warpage and breakage.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual measurements and openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

B. Adhesive: Acclimate adhesives to occupancy room temperatures with maximum temperature not to exceed 75 deg F.

1.9 WARRANTY

A. Manufacturer's Limited Warranty: Provide manufacturer's standard 10 Year Commercial and Residential Limited Warranty against defects in quartz surfacing sheet materials.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design: Wilsonart.

2.2 QUARTZ SURFACING SHEET MATERIAL

A. Acceptable Product: "Wilsonart Quartz."

B. Composition: Up to 93 percent quartz aggregate combined with polyester resin binders and proprietary pigments that are fabricated into slabs using vacuum vibrocompaction technology.

C. Material Thickness: Product Type 062 - 0.79-inch (2 cm) nominal.

D. Material Weight: 10 lbs./ft2 for 2 cm thick surfacing

E. Countertop Dimensions: Indicated on Drawings.

F. Conformance Standards:

1. NSF/ANSI Standard 51. 2.

2. UL 2818:

a. GREENGUARD Gold - Emission levels in UL 2818, Section 7.2 are applicable for building materials, finishes, and furnishings.

G. Physical Characteristics:

1. Flexural Strength: Greater than 4,500 psi; ASTM D 790.

2. Flexural Strain: Less than 0.375 percent; ASTM D 790.

3. Flexural Modulus: Greater than 3.75 MPsi; ASTM D 790.

4. Stain Resistance (24 Hour): No effect to moderate effect; NEMA LD-3.

5. Abrasion Resistance: Greater than 100 in.-lbs.; ASTM C 501.

6. Density: Greater than 2.1 g/cm3; ASTM C 97.

7. Compressive Strength (One Axis - Dry): Greater than 20,000 psi; ASTM C 170.

8. Moisture Absorption: Maximum 0.022 percent; ASTM C 97.

H. Quartz Finish: Polished finish with Glossometer reading greater than 45.

I. Color and Pattern: HANOLA GREY Q4044.

J. Edge Detail: 1/4" Radius.

2.3 ACCESSORY MATERIALS

A. Joint Adhesive: Methacrylate-based adhesive for chemically bonding quartz surfacing seams. Color complementary to quartz surfacing sheet material. UL 2818 GREENGUARD Gold certified and complies with SCAQMD Rule 1168.

1. Basis of Design: "Wilsonart Hard Surface Adhesive."

2. Other Acceptable Products: Pigmented knife grade adhesives suitable for use with quartz surfacing are also acceptable.

B. Elastomeric Sealant: Mildew-resistant silicone sealant for filling gaps between countertops and terminating substrates in wet environment applications. Complies with ASTM C 920, Type S (single component), Grade NS (nonsag).

1. Product: Acceptable to countertop manufacturer.

2. Color: [Complementary to quartz surfacing color] [Clear] [Selected from sealant manufacturer's standard offerings].

C. Siliconized Acrylic Sealant: Siliconized acrylic latex sealant. For general applications to fill gaps between countertops and at terminating substrates. Complies with ASTM C 834, Type OP, Grade NF, and SCAQMD Rule 1168.

1. Product: "Wilsonart Color Matched Caulk."

2. Color: [Complementary to quartz surfacing color] [Clear] [Selected from sealant manufacturer's standard offerings].

D. Construction Adhesive: Countertop manufacturer's recommended silicone-based construction adhesive for backsplashes, endsplashes, and other applications according to manufacturer's published fabrication instructions.

2.4 FABRICATION

A. Fabricate components in shop, to greatest extent practicable, in sizes and shapes indicated according to approved shop drawings and Wilsonart Quartz Fabrication Manual.

B. Form joint seams between quartz surfacing components with specified seam adhesive. Completed joints inconspicuous in appearance and without voids. Provide joint reinforced if required by manufacturer for installation conditions.

C. Provide holes and cutouts for plumbing fixtures and accessories indicated on approved shop drawings. Rout cutouts and finish edges smooth.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions that could adversely affect the work of this Section.

B. Substrates must be sound, flat, smooth, and free from dust or other surface contaminants.

C. Commencement of work will constitute acceptance of substrates and conditions to receive the work.

3.2 COUNTERTOP INSTALLATION

A. Install quartz surfacing components plumb, level, and true according to approved shop drawings and manufacturer's published installation instructions. Use woodworking and specialized fabrication tools acceptable to manufacturer.

1. Fasten quartz surfacing components to base cabinets or other supporting substrates with suitable adhesives acceptable to manufacturer.

B. Form joint seams with specified seam adhesive. Seams to be inconspicuous in completed work. Seams in locations shown on approved shop drawings and acceptable to manufacturer. Promptly remove excess adhesive.

1. Clamp or brace quartz surfaces in position until adhesive sets.

C. Fill gaps between countertop and terminating substrates with specified silicone sealant.

D. Install backsplashes and endsplashes where indicated on Drawings. Adhere to countertops with specified construction adhesive.

3.3 REPAIRS

A. If permissible to Architect, minor surface marring for quartz surfacing components may be repaired according to manufacturer's published installation instructions.

B. Remove and replace quartz surfacing components that are damaged and cannot be satisfactorily repaired.

3.4 CLEANING AND PROTECTION

A. Clean quartz surfacing components according to manufacturer's published maintenance instructions. Completely remove excess adhesives and sealants from finished surfaces.

B. Protect completed work from damage during remainder of construction period.

END OF SECTION 12 36 61.19

SECTION 22 00 00 - PLUMBING

DIVISION I REQUIREMENTS ARE A PART OF THIS SECTION

PART 1 – GENERAL: General Provisions of the Contract Documents to be included but not necessarily limited to General Conditions, Supplementary Conditions and sections of Division One of this project manual.

1.01 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing and piping and including the demolition and removal of certain existing fixtures, equipment, piping and appurtenances; all as required and as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.02 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. National Fire Protection Association.
2. State Division of Industrial Safety.
3. 2019 California Code of Regulations (CCR).
4. 2019 California Plumbing Code (CPC), Part 5, Title 24, 2007 California Code of Regulations (CCR).
5. 2019 California Fire Code, Part 9, Title 24.
6. County Health Department.
7. Any other legally constituted body having jurisdiction thereof.
8. 2019 California Building Code CBC:

a. Access to plumbing fixtures shall comply with all of the requirements of CBC Sections 11B-213.2 and 11B-213.3.
b. Heights and location of all fixtures shall be according to CBC Section 11B-602 through 11B-612.
c. Accessible fixture controls shall comply with CBC Section 11B-608.5 for Showers, 11B-607.5 for Bathtubs, 11B-606.4 for Lavatories and Sinks, 11B-604.6 for Water Closets, 11B-604.9.5 for children's Water Closets, 11B-602.3 for Drinking Fountains, 11B-605.4 for Urinals, and 11B-611.3 for Washing Machines and Clothes Dryers.
d. Each accessible sink shall not exceed 6½-inch deep. Sinks shall be mounted with the counter or rim no higher than 34" above finish floor. CBC Section 11B-606.3.

10. California Health and Safety Code Section 116875 – AB 1953.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.03 DRAWINGS

A. Because of the small scale drawings, it is not possible to indicate all offsets, fittings and accessories, which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices, which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his acceptance. Only when Architect's acceptance is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications between the specifications and the drawings, or in the drawings, the contractor shall include the cost of the most expensive alternate in the bid proposal. The contractor shall secure direction from the architect before start of any construction.

1.04 PERMITS, INSPECTIONS AND LICENSES

A. All permits; inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.05 UTILITIES

A. See Drawings for Points of Connection.

B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit

connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work

E. Sanitary Sewer: The Contractor shall be responsible for all costs incurred in connecting into the sanitary sewer as indicated on the drawings.

F. Water Service: The Contractor shall connect into the main water service line as indicated on the drawings. The installation shall be in accordance with the serving utility company's standards.

1.06 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.07 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.08 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid confliction and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

1.09 SUBMITTAL DATA (Also see Division I)

A. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to put identification numbers on fixtures and equipment schedules.

B. Manufacturers submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.

C. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.

D. A list of names is not a valid submittal. To be valid, all submittals must:

1. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.

2. Include all pertinent construction, installation, performance and technical data.

3. Have all copies marked to indicate clearly the individual items being submitted.

4. Have each item cross-referenced to the corresponding specified item and be marked to show how differences will be accommodated.

5. Contain calculations and other detailed data justifying how the item was selected for proposal. Data must be completed enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

6. Include, for every item, which differs in size, configuration, connections, service, accessibility, or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

7. In addition to the material and equipment submittals, the Contractor shall provide shop drawings of all underground utilities complete with all appurtenances and indicate exact location by dimension to grading plan, submit for review prior to installation.

1.10 UNINSPECTED WORK

A. Contractor shall not allow or cause any of his work to be covered up before it has been duly inspected, tested and approved by the Owner, Architect or any other authorized inspectors having legal jurisdiction over his work. Should he fail to observe the above, he shall uncover the work and, after it has been inspected, tested and approved, recover it at his own expense.

1.11 SUBSTITUTIONS (Also see Division I)

A. The Contractor assumes full responsibility that alternate manufacturers, items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures, which ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates were selected without proper regard to the requirements of the job, will not be approved. No more than one proposed alternate will be considered for each item.

B. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

C. Provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.

D. This Contractor is responsible to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.

E. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials and decisions of the Architect or that of his representative shall be final and conclusive.

1.12 RECORD DRAWINGS (Also see Division I)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.13 GUARANTEES (Also see Division I)

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship and shall not be less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT (See Schedules on Drawings)

A. General: Provide all materials and equipment as specified or required in the work, new and free from defects and imperfections.

B. Pipe and Fittings:

1. Soil and Waste Piping:

a. Soil and Waste Piping within the building itself and outside within five feet (5') of the foundation, except where indicated otherwise, shall be No-Hub cast iron pipe and fittings, asphaltum coated, free from defects, and shall conform to the requirements of CISPI Standard 301 ASTM A-888 or ASTM A-74 and manufactured by AB & I, Charlotte or Tyler. Fittings shall be up with "HUSKY" SD-4000 or "CLAMP ALL" 125 Stainless Steel, Heavy-Duty No-Hub Couplings and shall be in compliance with ASTM C-1540 and ASTM C-564 Standards, except all above ground vent piping joints may be made up with "ANACO", TYLER", or "MISSION" Standard-Duty No-Hub Coupling in compliance with CISPI –310, and ASTM C-564 Standards. At the contractor's option, Type "DWV" hard drawn copper waste, vents and end fittings with soldered joints may be used for above ground piping, except waterless urinal rough-in.

b. Except where otherwise indicated on the plans, building sewer piping from five feet (5') outside of the building to connections at the sewer shall be PVC (polyvinyl chloride) ASTM D3034, SDR-35 sewer pipe with locked-in gasket (ASTM F477, Elastomeric Seal).

2. Vent Piping:

a. Concealed or underground vent piping shall be cast iron pipe and fittings as specified for soil and waste piping.

b. Exposed vent piping shall be Schedule 40 galvanized steel pipe, ASTM A53, with black cast iron threaded drainage fittings.

3. Water Piping:

a. Piping within the building and above grade shall be Type "L" ASTM B88, hard drawn copper tubing with wrought copper sweat fittings ANSI B16.22.

b. Outdoor underground piping in sizes 2-1/2" and 3" shall be Type "L" ASTM B88, hard drawn copper as specified for water piping within the building. Piping 2" and smaller shall be Type "K" ASTM B88, hard drawn copper with wrought copper sweat fittings ANSI B16.22. Piping in sizes 4 inches and larger shall be PVC Class 150 DR-18 with ring-tite joints. Provide concrete thrust blocks at all underground fittings per manufacturer's recommendations.

c. Piping below the building floor shall be Type "K" soft annealed copper tubing with no fittings below the slab.

4. Gas Piping:

a. Gas piping within the building shall be Schedule 40 black steel pipe conforming to ASTM A53 using 150 pound banded malleable iron screwed fittings for piping 2" and smaller and weld type steel fittings for piping 2-1/2" and larger except all medium pressure gas shall be welded.

b. Exposed gas piping outside the building shall be Schedule 40 galvanized steel pipe conforming to ASTM A53 using galvanized 150 pound banded galvanized malleable iron screwed fittings for piping in sizes 2" and smaller and seamless weld type steel fittings for all medium pressure gas piping and piping 2-1/2" and larger. All outdoor welded black steel pipe and fittings shall be painted with oil base prime coat and oil base enamel finish.

7. Indirect Waste Piping: Shall be Type "L" copper as specified for water piping.

8. Condensate Drain Piping: (Air Conditioning units) Shall be Type "M" copper as specified.

9. Compressed Air / Vacuum Piping: Shall be Type "L" copper as specified for water piping.

10. Deionized Water (D.I.): Orion High Purity Piping shall be polypropylene ASTM D-1785 with plain ends and heat fused, socket type joints, polypropylene socket type schedule 80 fittings; heat fused joining per manufacturer's recommendations.

11. All exposed piping at plumbing fixtures shall be chrome plated yellow brass except exposed pipes in shop or utility areas.

13. Unions or flanges shall be furnished and installed at each threaded connection to all equipment or valves. The unions or flanges shall be located so that the piping can be easily disconnected for removal of the equipment, tank, or valve, and shall be of the type specified in the following schedule.

    a. Unions:

        1) Black Steel Pipe: 250 pound screwed black malleable iron, ground joint, brass to iron seat.

        2) Galvanized Steel Pipe: 250 pound screwed galvanized malleable iron, ground joint, brass to iron seat.

        3) Copper or Brass Tubing: 150 pound cast bronze or copper, ground joint, nonferrous seat with ends, by Walseal, NIBCO or Mueller.

14. All underground cast iron, ductile iron, copper, steel or other metallic piping located both inside and outside of building shall be encased within a minimum of 10 mil polyethylene plastic sleeve sealed water tight with polyvinyl chloride tape. Sleeve shall terminate 3″ above grade or floor slab.

15. All underground non-metallic piping shall have 16 gauge copper "Tracer Wire" continuous for entire length.

C. Valves:

1. General:

    a. Piping systems shall be supplied with valves arranged so as to give complete and regulating control of piping systems throughout the building, and located so all parts are easily accessible and maintained.

    b. Valve Design: Rising stem or outside screw and yoke stems. Non-rising stem valves may be used where space conditions prevent full extension of rising stems.

    c. Sizes: Same size as upstream pipe, unless otherwise indicated.

    d. Operators:

        1) Hand wheels fastened to valve stem for all valves other than quarter turn.

        2) Lever handles on quarter-turn valves, and provide plug valves with operating wrench.

3) Provide gear operator for valves 8 inch or larger.

e. Extended stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.

f. End Connection: 2 inches and under shall be threaded, 2-1/2 inches and larger shall be flanged or full lug style.

2. Approved Manufacturers:

a. Hammond
b. Watts
c. Nibco
d. Nordstrom
e. Apollo

3. Provide Class 150 valves meeting the valve specifications where Class 125 valves are specified but are not available.

4. Gate Valves:

a. Gate Valves, 2-Inch and Smaller: Hammond UP645, MSS SP-80; Ultra-Pure, 300 lb WOG., bronze body, threaded bonnet, ASTM B584; solid wedge disc, Bronze stem, Non-Asbestos packing gland, Grapwite packing, and malleable iron handwheel.

b. Gate Valves, 2-1/2-Inch & Larger: Hammond IR 1140, MSS SP-70; Class 125, iron body, bolted bonnet, flanged ends, non-rising stem, solid wedge, bronze trim, cast bronze seat rings.

5. Ball Valves: (Hammond UP8303A)

a. Ball Valves, 2 Inches and Smaller: Hammond UP8303A, MSS SP-110, Ultra Pure, rated for 150 psi saturated steam pressure, 600 psi WOG pressure; two-piece construction; with bronze body. Full port, brass ball with haro chrome plating, "Teflon" seats and seals, separate adjustable packing gland and nut, blowout-proof stem and vinyl covered steel handle.

b. D.I. Water: Orion True Union type, polypropylene full port ball valve, heat-fused socket connection, Vitron or EDPM O-rings and teflon seats, integral union at each end.

6. Valves: (for gas service)

a. Hammond Ball Valve, 8901 UL, FM, 2-Inch and Smaller: MSS-SP-110, Rated at 150 wsp-600 WOG; UL listed, brass body, chrome plated brass ball, and threaded ends. Valve shall be C.S.A. certified.

b. Walworth #1797F Plug Valves, 2-1/2 Inch and Larger: MSS SP-67; rated at 200 PSI CWP; lubricated plug type, with cast iron body, single gland, wrench operated, and flanged ends.

7. Globe Valves:

a. Globe Valves, (Hammond UP440), 2-Inch and Smaller: MSS SP-80; Ultra-pure, 300 lb. WOG threaded end, bronze body and threaded bonnet. ASTM B 584 cast bronze; composition disc, B-62 stem material brass packing gland, non-asbestos packing, and malleable iron handwheel.

b. Globe Valves, (Hammond IR 116), 2-1/2-Inch and Larger: MSS SP-85; Class 125 iron body and bolted bonnet conforming to ASTM A 126, Class B; with outside screw and yoke, flanged ends, bronze mounted, and non-asbestos packing, and two-piece backing gland assembly.

8. Butterfly Valves: (Hammond 6211-01/6211-03)

a. MSS SP-67; rated at 200 psi; cast-iron body conforming to ASTM A 126, Class B. Provide full lug style valves with field replaceable EPDM phenolic backed sleeve, aluminum bronze disc, stainless steel stem, and EPDM O-ring stem seals. Provide lever operators with locks.

9. Check Valves:

a. Swing Check Valves, (Hammond UP904), 2-Inch and Smaller: MSS SP-80; Ultra-pure, 300 lb WOG, threaded ends, cast-bronze body and cap conforming to ASTM B584; with horizontal swing, and brass disc.

b. Swing Check Valves, (Hammond IR 1124), 2-1/2 Inch and Larger: Class 125 (Class 175 UL/FM approved for fire protection piping systems), cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal wing, and bronze disc or cast-iron disc with bronze disc ring.

c. Lift Check Valves, (Hammond UP943), 2-Inch and Smaller: Ultra-pure, 200 lb WOG., threaded end cast-bronze body and cap conforming to ASTM B584; horizontal or angle pattern, lift-type valve, with bronze spring, cast bronze disc holder with renewable "Teflon" disc.

d. Non-Slam Check Valves (Hammond IR 9253). Provide non slam check valves on the discharge of pumps. Check valves to be silent closing, class 125, cast iron body, stainless steel spring leaded center guide.

10. Underground Valves (Four (4) Inches Larger): Mueller No. A-2360, Class 200 AWWA, C509, UL/FM listed, NSF 61, Resilient wedge gate double valves, flanged, mechanical joint or ring-tite, complete with traffic weight cast iron valve box with cast iron cover and operating wrench or approved equal by Clow or Stockham.

11. Hose Bibbs: Shall be Acorn or approved equal.

    a. Hose bibbs shall be bronze body with chrome or nickel plated finish, with renewable composition disc, have loose key 3/4" hose end with 3/4" female inlet and vacuum breaker. Vacuum breaker shall conform to ASSE Standard 1011 with finish to match hose bibb.

    b. Recessed Hose Bibbs: See schedule on drawings.

12. Combination Temperature and Pressure Relief Valves: Shall be McDonald, Watts, or approved equal, bronze body, test lever, thermostat, complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Relief valves shall be factory set for 210 degree F. and 150 p.s.i. pressure. Relief valves shall be type as recommended by water heater manufacturer.

13. Trap Primers: Provide where indicated on drawings of type as specified in equipment schedule complying with ASSE 1018. Install behind access panel.

14. Water Pressure Regulators: Shall be of the manufacturer, model and sizes as indicated on the drawings, AB1953 compliant, complete with shut-off valves (inlet and outlet of assembly), valve bypass, pressure gauges, strainers and pressure relief valves.

15. Gas Pressure Regulators: Shall be of the manufacturer, model and sizes as indicated on the drawings. Regulators installed in vaults shall be entirely corrosion proof and approved by the Gas Company.

D. Traps, Strainers and Tailpieces: Every sanitary fixture, unless otherwise specified, shall be provided with a seventeen (17) gauge tailpiece chromium tailpiece, a Los Angeles pattern chrome plated cast-brass trap, and wall flanges. Provide chromium plated brass casing between the trap and wall flanges with each fixture. All sanitary waste system floor drains and floor sinks shall have cast iron "P" traps.

E. Cleanouts: Shall be J.R. Smith, Zurn or Josam.

1. General: Provide cast-iron ferrule and countersunk brass clean-out plug with round cast iron access frame and heavy duty secured top cover.

2. Wall Cleanouts: Zurn No. Z-1468 for steel pipe and Zurn No. Z-1446-NH for cast iron pipe.

3. Floor Cleanouts: Zurn No. ZN-1400-NH, watertight ABS bronze plug and polished nickel bronze top.

4. Cleanouts to Grade: Zurn Heavy Duty Clean-out Housing ZN-1474-SG-IN with bronze plug set flush with surface for concrete areas. Asphalt or non-surfaced areas shall be installed with ring of concrete poured around the bottom flange six inches (6") below surface. Use cast iron soil pipe on cleanout risers. For cleanouts in non-traffic areas, terminate cleanout plug in concrete yard box.

5. Provide Enfield cleanout plugs for wall cleanouts on acid waste system.

F. Access Panels: Wall access panels shall be minimum 12" x 12" for concealed valves and other equipment unless otherwise specified or indicated. Ceiling access panels shall be 18" x 18" minimum.

1. Wall Panels: Elmdor, DW 12″ X 12″– AKL, 14-gage Stainless Steel, Allen Key Latch, for all tile walls and dry wall walls in toilet rooms. Access panels in dry wall walls in general areas shall be prime coated steel.

2. Ceiling Panels Elmdor, DW 18″ X 18″ –SS-AKL, prime coated steel, type as required for plaster, or dry wall ceilings. Allen Key Latch.

3. Fire Rated Walls: Elmdor, FR 12″ X 12″ –SS-CL, for all Fire rated tile walls and dry walls in toilet rooms. Fire rated access panels in dry wall. Walls in general areas shall be prime coated steel. Cylinder Lock.

G. Escutcheons: Shall be chrome plated cast brass with set screw locking device.

H. Water Hammer Arresters: Shall be provided where indicated on drawings of type indicated on equipment schedule and shall be sized per the manufacturer's recommendations. Install behind access panel.

I. Dielectric Union Isolators: Where incompatible materials come in contact, isolate from each other with material best suited for the characteristics of materials to be isolated. Dielectric union isolator for connection piping or non-compatible materials shall be of standard commercial design with threaded connections.

J. Pipe Supports: Unless otherwise indicated on the drawings, shall be as follows:

1. The Contractor shall furnish and install all miscellaneous iron work including angles, channels, etc., required to appropriately support the various piping systems. Hanger spacing and location shall conform to California Plumbing Code requirements.

2. All horizontal runs of piping within the building, except for copper water supply stub-outs at fixtures and copper supply headers within walls, to be supported from the structural framing with steel rods and split ring hangers: B-Line, Grinnell Company, Tolco,

or approved equal. Copper stub-outs and copper headers within walls to be supported from the wall framing with Holdrite pipe hangers and supports as specified at item O.9., below. Steel rods shall be secured to overhead framing with side beam connectors. Where necessary, install angle iron between framing to accommodate hanger rods. Where several pipes are running together, Unistrut, B-Line, or Powerstrut channels with clamps may be used in lieu of individual pipe hangers, and supported from structure as herein specified. Submit test data for type of hanger supports to be provided. For support conditions other than specified herein, the Contractor shall submit method of support for approval prior to any installation.

3. Makeshift, field devised methods of plumbing pipe support, such as with the use of scrap framing materials, are not allowed. Support and positioning of piping shall be by means of engineered methods that comply with IAPMO PS 42-96. These shall be Hubbard Enterprises/HOLDRITE support systems or Owner-approved equivalent.

4. Horizontal Piping Hangers and Supports:

   a. General: Provide factory fabricated horizontal hangers and supports complying with one of the following MSS types listed to suit horizontal piping systems, in accordance with MSS SP-69, IAPMO PS 42, and manufacturer's published information. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.

      1) Adjustable Steel Clevis Hangers: (MSS Type 1) B-Line B 3100

      2) Adjustable Swivel Pipe Rings: (MSS Type 5) B-Line B 3690

      3) Split Ring: (MSS Type 11)

      4) Pipe Alignment and Support Brackets: (Per IAPMO PS 42) HOLDRITE products (see section O.9.)

5. Vertical-Piping Clamps:

   a. General: Provide factory fabricated vertical-piping clamps complying with the following types listed, to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.

   b. Two-Bolt Riser Clamps: (MSS Type 8) B-Line B3373

   c. For vertical mid-span supports of piping 4" and under, use Hubbard Enterprises/HOLDRITE Stout Brackets™ with Hubbard Enterprises/HOLDRITE Stout Clamps or two-hole pipe clamps (MSS Type 26).

6. Hanger-Rod Attachments:

   a. General: Provide factory fabricated hanger-rod attachments B-Line, Tolco or approved equal, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-58 and manufacturer's published product information. Select size of hanger-rod attachment to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.

   b. Side beam eye socket, Tolco Fig. #57 for rod sizes 3/8" dia. and Tolco Fig. #25-30-251 for rod sizes 1/2" dia.

7. Building Attachments:

   a. General: Provide factory fabricated building attachments, selected by Installer to suit building structural framing conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.

   b. For existing concrete construction, provide expansion shields.

8. Hanger Rods and Spacing shall conform to the following table:

Pipe Sizes	Spacing	Rods
2 Inch and Smaller	6 Feet	3/8 Inch
2-1/2 Inch to 3 Inch	8 Feet	1/2 Inch
4 Inch and larger	8 Feet	5/8 Inch

9. Hangers and Supports shall be adequate to maintain alignment and prevent sagging and shall be placed within 18 inches of joint. Support shall be provided at each horizontal branch connection.

10. When securing copper water supply piping directly to the DWV piping or to the wall framing (horizontal water headers and fixture stub-outs), the following copper-plated components of the “HOLDRITE” system are to be used as a support system:

    a. For positioning supply/flush valve for wall-hung water closet, use model 114C (attaches to carrier) and 114C-EXT (extension for above, e.g., for fixtures to be used by handicapped).

    b. For attachment to wall framing, use models 101-26, 102-26.

11. Provide lateral bracing as manufactured by B-Line or approved equal for all piping to prevent swaying or movement in accordance with SMACNA "Guidelines for Seismic

Restraints of Piping Systems". Piping smaller than indicated in the guidelines shall be provided with bracing as specified for the smallest size indicated. The entire water distribution system shall be properly braced and will not move due to the action of quick closing of valves.

12. Miscellaneous Supports, Wall Brackets, Etc.: Provide where required in accordance with the best standard practices of the trade. Submit shop drawings for all fabricated supports where engineered supports are not available.

13. Isolators: All water piping shall be installed with a manufactured type isolator. Isolators shall be B-Line vibra clamp and cushion, Super Strut, Stoneman, "Trisolator", or approved equal. Piping shall be installed and supported in a manner to provide for expansion without strains. Guides shall be properly installed to ensure this requirement.

14. Shields:

    a. General: Provide 20 gauge galvanized sheet metal shields at piping hangers for all insulated piping. Size shields for exact fit to mate with pipe insulation.

15. Roof Mounted Piping: Pipe supports installed on roof shall be as manufactured by Mapa Products Model MS-12, Portable Pipe Hangers Inc., Model No. PP10 or approved equal. Support shall include all required clamps and devices for a complete system. Secure base of pipe support in adhesive on square roof pad in accordance with manufacturer's installation instructions. Proposed installation procedure shall have approval of roofing contractor.

Proposed installation procedure shall not violate existing roof warranty.

K. Insulation:

1. Hot Water Pipe Insulation: All hot water supply and return piping, except exposed connections to plumbing fixtures, flanges and unions shall be insulated with "Johns Manville" Armacell Imcoa closed cell polyethylene (PE) insulation, with J-M Zeston white PVC wrap jacket, and Zeston white PVC insulation fitting covers. Insulation shall be 1" thick for pipe sizes 1" and below, 1-1/2" thick for pipe sizes 1 ¼" and 1 ½", and 2" thick for pipe sizes 2" and larger. Insulated piping exposed in equipment rooms shall be covered with "Childers" 0.016 inch thick aluminum jacket installed per manufacturer's recommendations. Insulation shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2019 CMC Sec. 1201.2. Hot water piping below slab shall be insulated with "Johns Manville" Armacell Imcoa closed cell polyethylene (PE) insulation, with J-M Zeston white PVC wrap jacket, and Zeston white PVC insulation fitting covers. Insulation shall be 1" thick for pipe sizes 1" and below, 1-1/2" thick for pipe sizes 1 ¼" and 1 ½", and 2" thick for pipe sizes 2" and larger. Insulation shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2019 CMC Section 1201.2.

2. Storage Tank Insulation: Insulate storage tank with 2 inch thick "Johns Manville" Armacell Imcoa closed cell polyethylene (PE) insulation sheet or roll. Cover insulation with Childers aluminum jacket 0.016 inch thickness. Insulation shall have a flame spread of not more than 24 and a smoke density not exceeding 50 per 2019 CMC Sec. 1201.2.

3. Condensate Pipe Insulation: All condensate piping within building shall be insulated with "Johns Manville" Armacell Imcoa closed cell polyethylene (PE) insulation, with J-M Zeston white PVC wrap jacket, and Zeston white PVC insulation fitting covers. Insulation shall be 1" thick for pipe sizes 1" and below, 1-1/2" thick for pipe sizes 1 ¼" and 1 ½", and 2" thick for pipe sizes 2" and larger. Insulation shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2019 CMC Section 1201.2.

4. Indirect Waste Pipe Insulation: All indirect waste drains shall be insulated with "Johns Manville" Armacell Imcoa closed cell polyethylene (PE) insulation, with J-M Zeston white PVC wrap jacket, and Zeston white PVC insulation fitting covers. Insulation shall be 1" thick for pipe sizes 1" and below, 1-1/2" thick for pipe sizes 1 ¼" and 1 ½", and 2" thick for pipe sizes 2" and larger. Insulation shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2019 CMC Section 1201.2.

5. All insulation shall be continuous through supports and hangers, except at fixture stub-out support locations.

6. All fixtures that are accessible shall have an OFF-set grid drain permitting the trap to be installed flush with the wall. In addition provide PROWRAP insulation kit for exposed hot water pipe, tailpiece, and trap as manufactured by MCGUIRE, and secured per manufacturers recommendations.

6. Freeze Protection:

   a. All cold water piping located outdoors & on roof shall be insulated with "Johns Manville" Armacell Imcoa closed cell polyethylene (PE) insulation, with J-M Zeston white PVC wrap jacket, and Zeston white PVC insulation fitting covers. Insulation shall be 1" thick.

   b. All cold water piping located in exterior walls, within eaves & below roof in unconditioned spaces shall be insulated with "Johns Manville" Armacell Imcoa closed cell polyethylene (PE) insulation, with J-M Zeston white PVC wrap jacket, and Zeston white PVC insulation fitting covers. Insulation shall be 1" thick.

L. Equipment and Fixtures:

1. See schedule on drawings.

2. Fixtures:

   a. Accessible plumbing fixtures shall comply with all of the requirements of CBC Section 11B. Heights and location of all fixtures shall be as indicated on

construction documents and according to CBC Section 11B-602 through 11B-612. Fixture controls shall comply with CBC Section 11B-608.5 for Showers, 11B-607.5 for Bathtubs, 11B-606.4 for Lavatories and Sinks, 11B-604.6 for Water Closets, 11B-604.9.5 for children's Water Closets, 11B-605.4 for Urinals, 11B-602.3 for Drinking Fountains, and 11B-611.3 for Washing Machines and Clothes Dryers.

b. Plumbing fixtures shall be as manufactured by American Standard, Zurn or Kohler and as noted on the drawings. Drinking fountains shall be as manufactured by Haws. Sink and lavatory faucets shall be as manufactured by Chicago faucets. Push-Type faucets or as noted on the drawings. Lever-Operated and electronically controlled mechanisms are acceptable (controls to be operable with one hand: no tight grasping, pinching or twisting of the wrist). Force to activate controls to be no greater than 5 lbs. And Self-closing valves shall remain open for at least 10 seconds. CBC 11B-606.4.

c. Furnish complete with necessary trim, including stops. All trim and fittings shall be chrome-plated brass including handles, supply tailpieces, traps and escutcheons.

d. Connections to fixtures shall be in accordance with code requirements except as exceeded herein or on the drawings and in no case less than the supply stop size.

e. All plumbing fixture faucets submitted for review shall have identification label or certification showing compliance with California TITLE 24, PART 5, ARTICLE I, "Energy Conservation Standards". ARTICLE I, T20-1406; ARTICLE 2, T20-1525 and ARTICLE 4, 1604 and 1606.

f. Minimum waste sizes shall be four inch (4") for water closets and two inch (2") for lavatories.

g. Steel plate supports shall be provided for all wall hung fixtures. Supports shall be 3/8 inch thick x 6 inch wide steel plates recessed and lag screwed to wood studs or welded to steel studs and tapped for fixture bolts. Length and number of plates as required to satisfactorily support the fixtures installed.

h. Sinks shall not exceed 6-1/2" in depth and shall comply with CBC Section 11B-606.7 and 11B-306.

M. Laboratory System (Acid Waste and Service Piping): The Contractor shall run all service lines, rough-in and make final connections to all laboratory and workroom equipment. The work shall include furnishing, installing and connecting of all service lines, drain lines, piping within equipment in service turrets, hoods, through, under or along the backs of working surfaces and in reagent racks above countertops as required and indicated by Laboratory equipment manufacturer. The Contractor shall also install sinks complete with all required trim including faucets, cooks, sinks, strainers, and other devices furnished under Laboratory Equipment Section.

Furnish and install all vents and revents from traps to point of discharge. All sink tailpieces and traps shall be furnished and installed by Plumbing Contractor. Traps shall be "P" type of same material as acid waste system. The Contractor shall cooperate with the Laboratory Casework Contractor to provide a complete system, and that the Contractor shall include all necessary work (labor and/or materials or both) as required to complete the installation whether or not shown on the drawings or specified herein at no added cost to the Owner.

N. Kitchen Equipment & Fixtures: The Plumbing Contractor shall run all service lines, rough-in and make final connections to all fixtures and equipment provided by Kitchen Equipment Contractor. The work shall include installing and connecting of all sinks, drain lines, piping within equipment, through, under or along the backs of working surfaces as required and indicated by equipment manufacturer, Plumbing Contractor shall furnish and install all tailpieces, P-traps, hot and cold water stops, gas cocks as required for Kitchen Equipment furnished sinks and equipment. The Contractor shall also furnish and install sinks and equipment as indicated on plumbing drawings complete with all required trim including faucets, stops, cocks, and P-trap and strainers. The Plumbing Contractor shall also furnish and install all required vents and revents from traps, and all required indirect waste lines. All exposed piping and fittings shall be chrome plated, with the exception of drain line and P-trap serving garbage disposals that are larger than 2 inch in size. Sizes larger than 2 inch shall have type L copper drain and copper P-trap compete with union connections.

O. Water Heaters: (See equipment schedule on drawings) (ASHRAE 90.1 Std. Compliance)

1. Electric Water Heater shall be a glass-lined commercial electric model of the size and capacity as indicated on the drawings and as manufactured by A. O. Smith Corporation, Rheem, or Lochinvar. Heater shall be constructed in accordance with ASME code for 160 psi working pressure and shall bear appropriate symbol and listed with the National Board as required. Heater shall be listed with Underwriters' Laboratories and approved by National Sanitation Foundation. All internal surfaces of the heater exposed to water shall be glass-lined. The tank shall be cathodically protected with adequate extruded magnesium rod. The entire vessel is to be enclosed in a round steel enclosure with baked enamel finish. Control compartment to be hinged and shall house 120 volt control circuit transformer, transformer fusing, magnetic contactor, immersion style operating thermostat, element fusing per N.E.C., and commercial grade incoloy sheathed flange mounted elements with prewired terminal leads. All factory wired temperature controls include high temperature cut-off for each element, high and low pressure switches, indicating pilot light high limit, switch with manual reset. Foam insulation, (R-16), shall exceed latest requirements of ASHRAE 90.1-1999 for heat loss efficiency. Heater shall include ASME T & P relief valve and drain valve. See detail on drawings for additional safety devices.

2) See detail on drawing for additional safety devices.

3) The firing control system shall conform to the California Code safety requirements.

4) Circulating pump shall provide rust-free performance. Pump shall be provided with solid state intermittent pump controller.

4. Instantaneous Electric Water Heater: See schedule on drawing.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

A. Locations and Accessibility: Install equipment for ease of maintenance and repair. If changes in the indicated locations or arrangements are made by the Contractor, they shall be made without additional charges.

B. Openings: Furnish information to the other trades on size and location of openings which are required in walls, slabs, roof, for piping and equipment at the proper times.

C. Closing-In of Uninspected Work: Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and accepted by the Architect. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other trades, to its original and proper condition.

D. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact locations and depth of existing utility and service lines to which he is going to connect. Should existing conditions prevent for installation of piping as detailed on drawings or to make connection in manner indicated, Contractor shall confer with the Architect, Owner's representative and Engineer for Direction.

E. Excavation, Trenching and Backfill: Do all necessary trench excavation, shoring, backfilling and compaction required for the proper laying of the pipe lines. Remove all surplus earth materials from site.

1. Backfill shall be clean soil free from rocks and debris. Compact to ninety percent (90%) of surrounding soil. All piping both inside and outside of building shall be installed in a minimum 6" sand bed and covered with 6" of sand prior to backfill. Continue backfill with materials free of rocks and debris, properly moistened and mechanically tapered and compacted to 90% of surrounding soil. Compaction by flooding or jetting is expressly prohibited.

2. Water, soil and waste piping shall have twenty-four (24") of cover minimum, [fire main shall have thirty six (36″) of cover] except all PVC pipe material and all gas piping shall have thirty (30") of cover minimum. All other pipe shall have not less than eighteen inches (18") of cover, unless otherwise noted on the drawings. Offset gas and water piping as

required to permit crossover of underground piping systems, and electrical conduit systems.

3. Bottoms of Trenches: Cut to grade and excavate bell holes to ensure the pipes bearing for their entire length upon the outside periphery of the lower third of the pipe.

4. Trees: When it is necessary to excavate adjacent to existing trees, the Contractor shall use all possible care to avoid injury to trees and roots. Where a ditching machine is run close to trees having roots smaller than 2" in diameter, the wall of the trench adjacent to the trees shall be hand trimmed making clean cuts through the roots. All cuts through roots 1/2" and larger in diameter shall be painted with "Tree-Seal", or equal. Trenches adjacent to trees should be filled within 24 hours after excavation, but where this is not possible, the side of the trench adjacent to the tree shall be kept shaded with burlap or canvas. Stockpiling of earth or building materials within the drip line of trees is prohibited. Where any roots 2" and larger are encountered, the Contractor shall hand tunnel under root and protect it by burlap wrapping.

5. Water piping shall not be run in the same trench with sewer or drainage piping unless separated as required by the UPC as follows. The bottom of the water pipe at all points shall be at least twelve (12) inches above the top of the sewer or drain line. The water pipe shall be placed on a solid shelf excavated at one side of the common trench with a minimum clear horizontal distance of at least twelve (12) inches from the sewer or drain line.

6. No piping shall run in, through or above any electrical equipment rooms or spaces at any time.

7. Horizontal soil and waste piping shall be installed to a uniform grade of not less than one-fourth inch (1/4") per foot, unless otherwise indicated or directed.

F. Piping Installation:

1. All piping shall be concealed in finished portion of the building except where otherwise indicated or directed at the time the work is done. All piping shall be installed to clear all framing members and beams, even if drawings do not indicate same. Contractor shall constantly check the work of other trades so as to prevent any interference with the installation of this work.

2. All piping into stem walls and footings shall be double half lap wrapped with 1/8" thick "Armoflex" insulation. The Contractor shall also provide blocked out areas in stem wall and footing as required for the installation of the piping. All piping shall avoid the lower 8" of the footing and the Contractor shall coordinate and provide dropped footings as required for the installation of the underground piping.

3. Unions shall be installed on one side of all screwed shut-off valves, at both sides of screwed automatic valves and on all by-passes, at all equipment connections and elsewhere as indicated or required for ease of installation and dismantling.

4. Connections between copper tubing and equipment shall be with Mueller Brass Company, or approved equal, brass stream line copper to P.P.S. ground joint unions.

5. Corrosion Protection:

   a. All underground metallic piping such as cast iron (soil & storm drain), ductile iron (fire protection), copper (Water) or steel (gas) located both inside and outside of the building shall be encased within a minimum of 10 mil polyethylene plastic sleeve.

   b. All underground metallic valves, unions, fittings, flanges, bolts & appurtenances that are unable to be encased within sleeve as noted above shall be protected as follows.

      1) Provide heavy coating of "Henrys" oil base roof mastic over entire exposed surface.

      2) After mastic coating is completed and inspected, wrap entire metallic component with a minimum of 10 mil. polyethylene wrap overlapped 50% of the circumference and extended beyond ends of component as required for polyethylene to be secured to piping. The overlap seam shall be located to avoid backfill material from entering the encapsulated area. The ends and seam of the of the polyethylene material shall be secured to the piping and sealed with 3M Scotch/Wrap N. 50, 10 mil., 2" wide, printed, pipe wrap sealing tape.

      3) The mastic coating shall be inspected and approved prior to the finish application of the polyethylene material, which shall also be inspected.

G. Sleeves: Shall be schedule 40 galvanized steel where pipes pass through concrete foundation walls and 22 gauge galvanized sheet metal in all other walls, floors and partitions.

1. Isolate pipes through ground floor slabs with double wrap Kraft paper, unless pipe sleeves as specified above as indicated or required by code..

2. Pack space between pipe and sleeves with ceramic fiber rope so as to be absolutely watertight.

3. All sleeve penetrations in or through fire rated stud walls, ceilings or floors shall be protected & sealed per U.L. Fire Resistance System No. WL1001 for uninsulated pipe and No. WL5039 for insulated pipe. All sleeve penetrations in or through fire rated concrete/masonry walls, ceilings or floors shall be protected and sealed per U.L. Fire Resistance System No. C-AJ-1116 for un-insulation pipe and No. C-AJ-5002 for insulated pipe. See architectural plans for all locations of rated walls and other fire rated assemblies.

4. Hanger rods required to pass through fire rated finished ceilings shall be protected as specified here in above and an escutcheon plate provided at face of penetration.

H. Contraction and Expansion: Install all work in such a manner that its contraction and expansion will not do any damage to the pipes, the connected equipment, or the building. Install offsets, swing joints, expansion joints, seismic joints, anchors, etc., as required to prevent excessive strains in the pipe work. Seismic Expansion Joints between buildings & walkways shall be Metraflex, Global Flex Mfg., Kinflex, or equal. All supports shall be installed to permit the materials to contract and expand freely without putting any strain or stress on any part of the system. Provide anchors as necessary.

I. Pipe Joints and Connections:

1. Copper Tubing and Brass Pipe with Threadless Fittings:

a. Solder joints for copper shall be made with 95/5 lead free solder in accordance with manufacturer's recommendations for the service intended and shall be NSF/61 certified approved.

b. Use threaded adapters on copper tubing where threaded connections are required.

2. Welded Joints: All welding to be performed by welders certified as passing ASME Boiler and Pressure Code (Section IX) and shall comply with ASME Std. B31.1.0 and the American Welding Society, Welding Handbook.

J. All closet bends shall be adequately blocked and secured. Trap arms and similar connections installed below the floor level or under concrete slabs shall be adequately supported and anchored to prevent motion in any direction. All piping installed above grade within buildings shall be secured to structural framing with Unistrut or pipe clamps to provide a rigid installation. Piping utilizing gaskets as a seal shall be given prime consideration to providing adequate stability through proper supports and anchors because of its flexible nature.

K. Flexible piping of any kind will not be permitted except when indicated on drawings provide Dormont Safety System, flexible pipe appliance connector series 40, 50 & 60, female union, male nipple and grey PVC coated, CSA certified gas appliance connections. Kitchen gas appliances shall be connected with Dormont Deluxe gas connector kit with antimicrobial coating.

L. Each pipe penetration of the roof shall be separated from other piping and any roof equipment by a minimum of 18" to insure a proper pipe flashing installation.

M. Floor, Wall and Ceiling Plates: Where pipes pierce finished surfaces, C.P. brass split flanges with set screw lock shall be provided.

N. Roof Flashings: Extend pipe a minimum of seven inches (7") above finished roof line, except where a vandal proof hood is required in which case pipe shall extend to a height required to receive

the hood and also where specifically required to exceed this dimension by the local authority due to snow conditions.

O. Installation of Plumbing Fixtures:

1. Install each fixture at the exact height and location shown on the Architectural Drawings.

2. Set fixtures, supplies, trap and trap outlet square with the wall, in line with fixture outlets without any offsets, angles, or bends.

3. Grout joint between the fixtures and the walls or floors with polysulfide or silicone sealant to be smooth, even and watertight.

4. Watertight joints for drainage connections to all fixtures shall be made in accordance with the California Plumbing Code.

Q. Completion of Installation:

1. Cleaning and Flushing: Clean all equipment and materials thoroughly. Leave surface to be painted smooth and clean, ready for painting.

2. Flush each unit of water supply and distribution system thoroughly with clean water at the highest velocities attainable.

3. Clean all piping, valves, traps, water heaters, fixtures and other devices thoroughly and flush or blow out until free of scale, oil silt, sand, sediment, pipe dope and foreign matter of any kind.

Existing Ceilings: The removal of existing ceiling materials necessary to permit for the installation of the above ceiling piping shall be performed by skilled and properly equipped workman. After completion of the installation all removed ceiling shall be replaced. Should damage occur to the ceiling during replace with new materials to match adjacent surface in kind of texture, material and color.

3.02 CUTTING & PATCHING (See Division I)

A. The cutting and patching of existing construction shall be coordinated in advance of the work.

B. Where required to remove, cut or core drill existing building walls, partitions, floors, ceilings and roof and outdoor paved and landscaped areas in order to install the work as indicated, the Contractor shall cut and patch existing construction to match adjacent areas in a manner that will not result in visual evidence of any cutting or patching. The materials, finishes and methods of installation shall match the existing adjacent surfaces and shall be in accordance with the requirements of other applicable sections of these specifications.

C. Unless specified on structural drawings, any alterations or modifications to a structural element by cutting, drilling, boring, bracing, welding, etc., shall have written approval by Structural Engineer of record and DSA prior to start of work.

3.03 STERILIZATION OF DOMESTIC WATER LINES

A. Sterilize new or repaired water lines by filling with a solution containing fifty (50) parts of chlorine per million parts water and holding the solution therein for at least twenty-four (24) hours with a water head of at least five feet (5') above the highest point in the system. Unless otherwise directed, thoroughly flush each line prior to sterilization. Introduction of sterilizing solution or materials into the lines shall be such as to provide thorough and uniform distribution throughout the system.

B. Operate all valves during the retention period. Following retention period, the heavy chlorinated water shall be flushed from the system with clean water.

C. Continue flushing until the residual chlorine at the end of 24 hours does not exceed the chlorine residual in the flushing water.

D. All work and certification of performance must be done by an approved laboratory utilizing qualified applications and personnel.

3.04 TESTING

A. No piping work shall be concealed or covered until piping has been tested, inspected and approved by the Inspector. All piping for plumbing systems shall be completely installed and tested as required by the California Plumbing Code. Test pressures and times indicated are a minimum only. All tests shall be as required by the governing authority as well.

Schedule of Test Pressures:

System Tested	Gauge	Test	Duration
Water	100 Pounds or 1½ times working pressure whichever is greater.	Water	4 Hours
Gas	60 Pounds	Air	4 Hours
Waste, Vent & Storm Drain	Per California Plumbing Code (Minimum 10 Feet of Head)		

3.05 OPERATION INSTRUCTION

A. Prior to occupancy or prior to the date of final inspection, whichever may occur first, the Contractor shall prepare two (2) sets of typewritten instructions for the operation of all equipment, valves, etc., specified and furnished as a part of the work under this section, and shall assign a

competent person, thoroughly familiar with the job, to demonstrate and instruct a representative of the Owner in the operation of the equipment. The time of said demonstration and instructions shall be arranged with the Owner's representative approximately one (1) week in advance. Verbal instructions shall include shut-off location of gas and water. The Contractor shall assemble all operation and maintenance data supplied by the manufacturers of the various pieces of equipment, all keys and special wrenches required to operate and service the equipment (including keys for yard boxes, gas stops and fixture stops), and all equipment warranties and deliver same to the representative of the Owner on date of said instructions.

3.06 PIPE AND EQUIPMENT IDENTIFICATION

A. Each operating and service line shut-off valve shall be identified by a 19 ga. brass tag with stamped, engraved type of service identified, complete with hole and brass chain mounted on valve stem or handle. Tag shall be a minimum of one and one-half inch (1½ ") in diameter. The contractor shall provide valve chart (framed and mounted in Custodial Room) with size, type and location of all shutoff valves. Valves shall be numbered to match corresponding valve tag.

B. Access Panel Markers: Provide manufacturers standard 1/16 inch thick engraved plastic laminate marker, with abbreviations and numbers corresponding to concealed valve.

C. Provide on exterior wall of each building opposite the building's main gas service a sign reading "Gas Shut Off". Sign shall be metal with minimum 1½ " high embossed letters.

D. All equipment shall be provided with name plate indicating all pertinent information on it.

E. Manufacturer's (Seton or Bradt) standard permanent, bright colored, continuous printed plastic tape, intended for [all interior piping and] direct-burial service, piping not less than 6 inches wide x 4 mils thick. Provide multi-ply tape consisting of solid aluminum foil core indicating type of service of buried pipe between two layers of plastic tape. The warning plastic (service identified) tape shall be placed one (1) foot above all buried pipe.

3.07 SCHEDULING OF WORK:

A. The facilities will be in operation during the entire period of construction. The Contractor shall be responsible for the proper scheduling of his work to insure that the existing mechanical systems to be replaced, modified and extended into existing utilities are kept in operation during the entire period of construction. When interrupted service are unavoidable, the Contractor shall confer with the Owner's authorized representative to determine at what times the connections can be made to minimize the interruptions to the normal operation of the facilities. To minimize shutdown period, the Contractor shall utilize the freeze ice plugging method of chilled water piping isolation. The Contractor shall submit a detailed description of the freeze ice plugging operation procedure and shall receive approval from the Owner's representative prior to start of work.

B. Certain piping and equipment are presently insulated and asbestos compounds. The work required for this asbestos removal will be the responsibility of the Owner and shall be in full

compliance with all governing authorities. The Owner shall certify that all asbestos removal has been completed prior to contractor's start of work.

3.08 DEMOLITION

A. General: Provide all work necessary for demolition, dismantling, cutting & alterations as indicated, specified and required for completion of the work. The work shall include but not be limited to the following major items.

1. Protection of existing work to remain.

2. Disconnecting & capping sewers.

3. Removal of items as indicated on drawings.

4. Salvageable items to be retained by Owner.

B. Project Site Conditions:

1. Drawings may not indicate in detail all demolition to be carried out. Contractor shall carefully examine existing work to determine full extent of demolition required for completed work to conform to drawings and specifications.

2. Existing work to remain that is damaged during and by demolition operations shall be repaired or replaced to satisfaction of the Owner at no cost to the Owner.

3. Contractor shall be solely responsible for damage resulting from inadaquate or improper support demoltion procedures including dust containment.

C. Coordinate:

1. Prior to commencement of work, contact the owner's representative to confirm that all items identified to be removed are clearly marked.

2. Coordinate demolition with other trades to ensure correct sequence, limits, and methods of proposed demolition. Schedule work to create least possible inconvenience to operation of the facility.

D. Salvage: The owner's representative shall determine with the contactor certain items that are to be kept by the Owner & these items shall be taken by the contractor to a place of storage as directed by the Owners. All other demolition items shall be removed from the premiers by the contractor.

E. Protection:

1. Do not demolition until temporary, barricades, warning signs and other forms of protection are installed.

2. Provide all safeguards, including warning sings and lights, barricades, and the like during demolition.

3. Noise, Dust and Water Controls: Containment shall be provided as required.

4. Safety: If at any time safety of exiting construction appears to be endangered, Contractor shall take immediate measures to support such endangered construction; operations and immediately notify the Owners representative.

F. Removal Of Existing Plumbing, Piping, Fixtures, And Services: Contractor shall remove from site existing piping, plumbing g equipment, fixtures and services not indicated fro reuse and not necessary for completion of work. Cap services to their portion of work prior to commencement of, or during work of, this section.

G. Patching: Patch materials, which are to remain when damaged by this work. Finish material and appearance of patch or repair work shall match existing contiguous materials and finishes in all respects

H. Clean-Up/Disposal: Debris waste, and removed materials, other than items to be salvaged, are Contractor's property for legal disposal off site. Continuously clean up and remove these items and do not allow accumulating in building(s) or on site.

END OF SECTION

SECTION 22 07 19 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic hot-water piping.
2. Domestic recirculating hot-water piping.
3. Condensate drain piping.

B. Related sections:

1. Section 220716 "plumbing equipment insulation."

1.2 ACTION SUBMITTALS

A. Product data: for each type of product indicated.

1.3 QUALITY ASSURANCE

A. Surface-burning characteristics: for insulation and related materials, as determined by testing identical products according to ASTME 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation installed indoors: flame-spread index of 25 or less, and smoke-developed index of 50 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "piping insulation schedule, general," "indoor piping insulation schedule," articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871

D. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

E. Flexible elastomeric insulation: closed-cell, sponge- or expanded-rubber materials. Comply with ASTM 534, type I for tubular materials.

1. Products: subject to compliance with requirements, provide available products that may be incorporated into the work include the following:

a. "Johns Manville" Armacell Imcoa closed cell polyethylene (PE) insulation, with J-M Zeston white PVC wrap jacket, and Zeston white PVC insulation fitting covers.

F. Glass Fiber Pipe Insulation:

1. Products: subject to compliance with requirements, provide available products that may be incorporated into the work include the following:

a. “Johns Manville” Micro-Lok 750 AP.

2.2 PROTECTIVE SHIELDING GUARDS

A. Protective shielding pipe covers:

1. Manufacturers: subject to compliance with requirements, provide products available manufacturers offering products that may be incorporated into the work include the following:

a. Engineered brass company Insul-tect products co.; a subsidiary of MVG molded products
b. Mcguire manufacturing, 80 Series & 12 Series.
c. Truebro; a brand of IPS corporation.
d. Zurn industries, llc; tubular brass plumbing products operation.
e. Johns Manville Zeston white PVC fitting covers.
f. Johns Manville Micro-Lok 750AP, Factory Applied White Jacket.
g. LAV Guard2.
h. Truebro.

2. Description: manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with disabilities act (ADA) requirements. (White Jackets required)

B. Protective shielding piping enclosures:

1. Manufacturers: subject to compliance with requirements, provide products by available manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:

a. Truebro; a brand of ips corporation. (White Jackets required)
b. Mcguire manufacturing. (White Jackets required)
c. Zurn industries, llc; tubular brass plumbing products operation. (White Jackets required)
d. Johns Manville.

2. Description: manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ada requirements. (White Jackets required)

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface preparation: clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

3.3 PENETRATIONS

A. Insulation installation at interior wall and partition penetrations (that are not fire rated): install insulation continuously through walls and partitions.

B. Insulation installation at fire-rated wall and partition penetrations: install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in section 078413 "penetration firestopping" for firestopping and fire-resistive joint sealers.

3.4 INSTALLATION OF INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation installation on pipe fittings and elbows:

1. Install “Johns Manville” Zeston white PVC fitting covers.

2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation installation on valves and pipe specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings for each pipe service defined in the "piping insulation schedule, general" article.

C. All insulation applications will be considered defective work if sample inspection reveals noncompliance with requirements.

3.6 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range.

B. Items not insulated: unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.7 INDOOR PIPING INSULATION SCHEDULE

A. Domestic hot and recirculated hot water: insulation shall be the following:
1. Glass Fiber pipe insulation with Factory applied white jacket, J-M Micro-Lok 750AP.

B. Exposed sanitary drains, domestic water, domestic hot water, and stops for plumbing fixtures for people with disabilities: insulation shall be the following:

1. Glass Fiber pipe insulation with Factory applied white jacket, J-M Micro-Lok 750AP.

C. Domestic hot and recirculated hot water: insulation shall be the following:

1. J-M Armacell Imcoa closed cell Polyethylene (PE) Foam Pipe insulation, with J-M Zeston White PVC wrap jacket, and Zeston white PVC insulation fitting covers: pipe sizes 1 inch and smaller - 1 inch thick insulation, pipe sizes 1 1/4 inch to 1 1/2 inches - 1.5 inches thick insulation, and for pipe sizes 2 inches and larger – 2 inch thick insulation.

END OF SECTION 22 07 19

SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.

1.2 ACTION SUBMITTALS

A. Product data: for transition fittings and dielectric fittings.

1.3 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "piping schedule" article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-PW."

2.2 COPPER TUBE AND PRO-PRESS FITTINGS

A. Hard copper tube: ASTM B 88 Type L water tube, drawn temper.

B. Soft copper tube: ASTM B 88 Type L water tube, annealed temper.

C. Wrought-copper, Pro-press fittings.

D. Copper unions:

1. Pro-press fittings.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seatings.

4. Solder-joint or threaded ends.

2.3 PIPING JOINING MATERIALS

A. Pro-press fittings.

B. Solder filler Metals: ASTM B 32, lead-free alloys. Silvabrite 100, Lead Free.

C. Flux: ASTM B 813, water flushable. Wisemans Everflux.

D. Brazing filler metals: AWS A5.8/A5.8M, BCuP series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 TRANSITION FITTINGS

A. General requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-type transition couplings: manufactured piping coupling or specified piping system fitting.

2.5 DIELECTRIC FITTINGS

A. General requirements: assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric unions:

1. Manufacturers: subject to compliance with requirements, provide products by the available manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:

a. Capitol Manufacturing Company; member of the Phoenix Forge Group.
b. Central Plastics Company.
c. Hart Industries International, INC.
d. Jomar International.
e. Matco-Norca.
f. McDonald, A. Y. Mfg. Co.
g. Watts; a division of Watts Water Technologies, INC.
h. Wilkins; a Zurn Company.
i. Pro-press fittings.

2. Standard: ASSE 1079.
3. Pressure rating: 150 psig (860 kpa) minimum at 180 deg f (82 deg c)
4. End connections: Pro-press fittings, solder-joint copper alloy and threaded ferrous.

C. Dielectric nipples:

1. Manufacturers: subject to compliance with requirements, provide products by the available manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:

   a. Elster Perfection Corporation.
   b. Grinnell Mechanical Products; Tyco Fire Products lp.
   c. Matco-Norca.
   d. Precision Plumbing Products, inc.
   e. Victaulic Company.
   f. Pro-press fittings.

2. Standard: IAPMO PS 66.
3. Electroplated steel nipple complying with ASTM F 1545.
4. Pressure rating and temperature: 300 psig (2070 kpa) at 225 deg f (107 deg c)
5. End connections: male threaded or grooved.
6. Lining: inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in section 312000 "earth moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA'S "copper tube handbook."

C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.

D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in section 220519 "meters and gages for plumbing piping" and with requirements for drain valves and strainers in section 221119 "domestic water piping specialties."

E. Install shutoff valve immediately upstream of each dielectric fitting.

F. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in section 221119 "domestic water piping specialties."

G. Install domestic water piping level and plumb.

H. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

I. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices in section 220548 "vibration and seismic controls for plumbing piping and equipment."

J. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

K. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

L. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

M. Install piping to permit valve servicing.

N. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

O. Install piping free of sags and bends.

P. Install fittings for changes in direction and branch connections.

Q. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

R. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gages in section 220519 "meters and gages for plumbing piping."

S. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in section 221123 "domestic water pumps."

T. Install thermometers on outlet piping from each water heater. Comply with requirements for thermometers in section 220519 "meters and gages for plumbing piping."

U. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in section 220517 "sleeves and sleeve seals for plumbing piping."

V. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in section 220517 "sleeves and sleeve seals for plumbing piping."

W. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in section 220518 "escutcheons for plumbing piping."

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded joints: thread pipe with tapered pipe threads according to ASME B 1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full id. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged threads: do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed joints for copper tubing: comply with CDA'S "copper tube handbook," "brazed joints" chapter.

E. Soldered joints for copper tubing: apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA'S "copper tube handbook."

F. Pressure-sealed joints for copper tubing: join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.

G. Joints for dissimilar-material piping: make joints using adapters compatible with materials of both piping systems.

3.4 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition fittings in underground domestic water piping:

1. Fittings for NPS 1-1/2 (DN 40) and smaller: fitting-type coupling.
2. Fittings for NPS 2 (DN 50) and larger: sleeve-type coupling.

3.5 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric fittings for NPS 2 (DN 50) and smaller: use dielectric unions.

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in section 220548 "vibration and seismic controls for plumbing piping and equipment."

B. Comply with requirements for pipe hanger, support products, and installation in section 220529 "hangers and supports for plumbing piping and equipment."

1. Vertical piping: MSS type 8 or 42, clamps.
2. Individual, straight, horizontal piping runs:

a. 100 feet (30 m) and less: MSS type 1, adjustable, steel clevis hangers.
b. Longer than 100 feet (30 m): MSS type 43, adjustable roller hangers.
c. Longer than 100 feet (30 m) if indicated: MSS type 49, spring cushion rolls.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch (10 mm).

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 (DN 20) and smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.

F. Install supports for vertical copper tubing every 10 feet (3 m).

G. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
1. Water heaters: cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. Plumbing fixtures: cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
3. Equipment: cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 (DN 65) and larger.

3.8 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in section 220553 "identification for plumbing piping and equipment."

B. Label pressure piping with system operating pressure.

3.9 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. piping inspections:

a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

1) Roughing-in inspection: arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
2) Final inspection: arrange for authorities having jurisdiction to observe tests specified in "piping tests" subparagraph below and to ensure compliance with requirements.

c. Reinspection: if authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
d. Reports: prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping tests:

a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. Cap and subject piping to static water pressure of 50 psig (345 kpa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.10 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves and hose bibbs.
2. Open shutoff valves to fully open position.
3. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.11 CLEANING

A. clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 OR AWWA C652 or follow procedures described below:

a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
b. Fill and isolate system according to either of the following:

1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/l) of chlorine. Isolate with valves and allow to stand for 24 hours.

c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
d. Repeat procedures if biological examination shows contamination.
e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.12 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Under-building-slab, domestic water piping, one half inch pipe size for trap primers shall be the following:

1. Soft annealed copper tube, ASTM B 88, Type K with no joints below the slab.

C. Above ground domestic water piping, one half inch to two inch pipe size shall be the following:
1. Hard copper tube, ASTM B 88, Type L wrought-copper, Pro-press fittings.

END OF SECTION 22 11 16

SECTION 22 42 16 16 COMMERCIAL SINKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Classroom Sinks
2. Sink faucets.

1.3 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.
9. Access plumbing fixtures shall comply with all of the requirements of CBC Division 6.
10. Heights and location of all fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.
11. Accessible fixture controls shall comply with CBC Sections 11B-611.3 for lavatories and sinks.
12. Accessible lavatories and sinks shall be mounted with the front of the higher of the rim or counter surface 34" maximum above the finish floor or ground. Depth of lavatories or sinks shall not interfere with knee an toe clearance provided in accordance with CBC 11B-306 when forward approach is required CBC Sections 11B-606.3 and 11B606.7.
13. Water supply and drain pipes under accessible lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under accessible lavatories or sinks. CBC Section 11B-606.5.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall

protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:

    a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
    b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
    c. Include all pertinent construction, installation, performance and technical data.

d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled “SPECIFIED ITEM, NOT SUBMITTED”. Product data sheets for the corresponding proposed substitution item shall be clearly labeled “PROPOSED SUBSTITUTION”.

b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor’s responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.

5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1.12 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.13 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.14 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 Equipment and Fixtures:

A. Fixtures:

1. See schedule on drawings.

2.2 CLASSROOM SINKS

A. Stainless steel, counter mounted.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Haws Manufacturing.
b. Just Manufacturing.

2. Fixture:

a. Standard: ASME A112.19.3/CSA B45.4.
b. Type: Ledge back.
c. Number of Compartments: One
d. Overall Dimensions: 25 by 17 inches
e. Metal Thickness: 0.050 inch
f. Compartment:

1) Dimensions: See Plumbing Fixture Schedule
2) Drain: Grid with NPS 1-1/2 tailpiece with stopper
3) Drain Location: Centered in compartment.

2.3 SINK FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet-spout materials that will be in contact with potable water.

B. Sink Faucets: Manual Type, Push Button.

1. Commercial, Solid-Brass Faucets.

a. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following

1) Chicago Faucets.

2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.
4. Body Material: Commercial, solid brass.

5. Finish: Chrome plated.
6. Maximum Flow Rate:

    a. Sinks: 1.8 gpm.

7. Mounting Type: Back/wall, exposed.
8. Vacuum Breaker: Required for hose outlet.
9. Spout Outlet: Hose thread according to ASME B1.20.7.

2.4 SINK BUBBLER

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet-spout materials that will be in contact with potable water.

B. Sink Bubbler: Manual Type, Push Button.

1. Commercial, 304 Stainless Steel Bubbler.

    a. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

        1) Just Manufacturing.

2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Cold-water indicators; coordinate bubbler inlets with supplies and fixture hole punching's; coordinate outlet with spout and sink receptor.
4. Body Material: Commercial, solid brass.
5. Finish: Highly buffed/mirror.
6. Mounting Type: Deck mounted, exposed.
7. Spout Outlet: Conforms with:

    a. SDF/ANSI 61/9 – Annex G
    b. AB1953 compliant

2.5 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless-steel wall flange.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Chicago

D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Chicago

E. Operation: Loose Key.

2.6 SINK WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/2 offset and straight tailpiece.

C. Trap:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. McGuire MFG.

2. Size: NPS 1-1/2.
3. Material: Chrome-plated, seamless prewrapped cast-brass trap and swivel elbow, and chrome-plated brass or steel wall flange.

2.7 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Locations and Accessibility: Install equipment for ease of maintenance and repair. If changes in the indicated locations or arrangements are made by the Contractor, they shall be made without additional charges.

B. Openings: Furnish information to the other trades on size and location of openings which are required in walls, slabs, roof, for piping and equipment at the proper times.

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

D. Closing-In of Uninspected Work: Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other trades, to its original and proper condition.

3.2 INSTALLATION

A. Install sinks level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-hung sinks.

C. Install accessible wall-mounted sinks at handicapped/elderly mounting height according to ICC/ANSI A117.1.

D. Set floor-mounted sinks in leveling bed of cement grout.

E. Install water-supply piping with stop on each supply to each sink faucet.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with sink. Comply with valve requirements specified in Section 220523 "General-Duty Valves for Plumbing Piping."
2. Install stops in locations where they can be easily reached for operation.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

G. Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

H. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of sinks, inspect and repair damaged finishes.

B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed sinks and fittings.

D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

3.6 Completion of Installation:

A. Cleaning and Flushing: Clean all equipment and materials thoroughly. Leave surface to be painted smooth and clean, ready for painting.

B. Flush each unit of water supply and distribution system thoroughly with clean water at the highest velocities attainable.

C. Clean all piping, valves, traps, water heaters, fixtures and other devices thoroughly and flush or blow out until free of scale, oil silt, sand, sediment, pipe dope and foreign matter of any kind.

3.7 PLUMBING FIXTURES

A. Accessible plumbing fixtures shall comply with all of the requirements of CBC Division 6.

B. Heights and location of all accessible fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.

C. Fixture controls shall comply with CBC Sections 11B-606.4 for lavatories and sinks.

D. Accessible sinks shall be 6-1/2″ deep maximum. Sinks shall be mounted with front of the higher of the rim and counter surface 34″ maximum above the finish floor or ground.

E. Water supply and drain pipes under lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under lavatories and sinks. CBC Section 11B-606.

END OF SECTION 22 42 16 16

SECTION 26 01 00 - GENERAL ELECTRICAL SPECIFICATIONS

1.1 WORK INCLUDED:

A. This specification shall apply to all phases of Work hereinafter specified, shown on Drawings, or as required to provide a complete installation of electrical systems for this Project. Work required under this specification, is not limited to just the Electrical Drawings - refer to Architectural, Structural, Landscape, and Mechanical / Plumbing Drawings, as well as all other drawings applicable to this project, which designate the scope of work to be accomplished. The intent of the Drawings and Specifications is to provide a complete and operable electrical system that includes all documents that are a part of the Contract.

1. Work Included. Furnish labor, material, services and skilled supervision necessary for the construction, erection, installation, connections, testing, and adjustment of all circuits and electrical equipment specified herein, or shown or noted on Drawings, and its delivery to the Owner complete in all respects ready for use.
2. The electrical Work includes installation or connection of certain materials and equipment furnished by others. Verify installation details, installation and rough-in locations from the actual equipment or from the equipment shop drawings.

B. Electrical Drawings. Electrical Drawings are diagrammatic, and are intended to convey the scope of work, indicating intended general arrangement of equipment, conduit and outlets. Follow Drawings in laying out Work and verify spaces for installation of materials and equipment based on actual dimensions of equipment furnished.

1.2 QUALITY ASSURANCE

A. Design, manufacture, testing and method of installation of all apparatus and materials furnished under requirements of these specifications shall conform to latest publications or standard rules of the following:

- Institute of Electrical and Electronic Engineers - IEEE
- National Electrical Manufacturers' Association - NEMA
- Underwriters' Laboratories, Inc. - UL
- National Fire Protection Association - NFPA
- Federal Specifications - Fed. Spec.
- American Society for Testing and Materials - ASTM
- American National Standards Institute - ANSI
- National Electrical Code - NEC
- National Electrical Safety Code - NESC
- Insulated Cable Engineers Association - ICEA
- American Institute of Steel Construction - AISC
- State and Municipal Codes In Force In The Specific Project Area
- Occupational Safety and Health Administration (OSHA)
- Electronics Industries Association/ Telecommunications Industry Association (EIA/TIA)
- California Electrical Code (where adopted)
- Local Authority Having Jurisdiction (AHJ) Published Electrical Standards and Codes

B. Perform Work in accordance with the National Electrical Code, applicable building ordinances, and other applicable codes, hereinafter referred to as the "Code." The Contractor shall comply with the Code including local amendments and interpretations without added cost to the Owner. Where Contract Documents exceed minimum requirements, the Contract

Documents take precedence. Where code conflicts occur, the most stringent shall apply unless variance is approved.

1. Comply with all requirements for permits, licenses, fees and codes. The Contractor, at Contractor's expense, shall obtain all permits, licenses, fees, special service costs, inspections and arrangements required for Work under this contract, unless otherwise specified.
2. Comply with requirements of the applicable utility companies serving this Project. Make all arrangements with utility companies for proper coordination of Work.

1.3 GENERAL REQUIREMENTS

A. Guarantee: Furnish a written guarantee for a period of one (1) year from date of acceptance.

B. Wherever a discrepancy in quantity or size of conduit, wire, equipment, devices, circuit breakers, etc., (all materials), arises on the Drawing and/or Specifications, the Contractor shall be responsible for providing and installing all material and services required by the strictest condition noted on Drawings and/or in Specifications to ensure complete and operable systems as required by the Owner and Engineer.

C. All Core Cutting, Drilling, and Patching:

1. For the installation of work under this Section, the aforementioned shall be performed under this Section of the Specifications and the Concrete section of the Specifications.
2. No holes will be allowed in any structural members without the written approval of the Project's Structural Engineer.
3. For penetrations of concrete slabs or concrete footings, the work shall be as directed in the Concrete Section of Specifications.
4. The Contractor shall be responsible for patching and repairing surfaces where he is required to penetrate for work under this contract.
5. Penetrations shall be sealed to meet the rated integrity of the surface required to be patched and repaired. The patched surface shall be painted or finished to match the existing surface.

D. Verifying Drawings and Job Conditions:

1. This Contractor shall examine all Drawings and Specifications in a manner to be fully cognizant of all work required under this Section.
2. This Contractor shall visit the site and verify existing conditions. Where existing conditions differ from Drawings, adjustment(s) shall be made and allowances included for all necessary equipment to complete all parts of the Drawings and Specifications.

1.4 WORK IN COOPERATION WITH OTHER TRADES

A. Examine the Drawings and Specifications and determine the work to be performed by the electrical, mechanical and other trades. Provide the type and amount of electrical materials and equipment necessary to place this work in proper operation, completely wired, tested and ready for use. This shall include all conduit, wire, disconnects, relays, and other devices for the required operation sequence of all electrical, mechanical and other systems or equipment.

B. Provide a conduit only system for low voltage wiring required for control of mechanical and plumbing equipment described in this or other parts of the Contract Documents. Install all control housings, conduits and backboxes required for installing conductors and wire to the

controls.

C. Install separate conduits between each heating, ventilating and air conditioning sensing device and its control panel and/or control motor. Before installing any conduit for heating, ventilating and air conditioning control wiring, verify the exact requirements from the control diagrams provided with the equipment manufacturer's shop drawings.

1.5 TESTING AND ADJUSTMENT

A. Upon completion of all electrical work, this Contractor shall test all circuits, switches, light fixtures, lighting control & dimming systems including distributed systems, motors, circuit breakers, motor starters and their auxiliary circuits and any other electrical items to ensure perfect operation of all electrical equipment.

B. Equipment and parts in need of correction and discovered during such testing, shall be immediately repaired or replaced with all new equipment and that part of the system shall then be retested. All such replacement or repair shall be done at no additional cost to the Owner.

C. All circuit(s) shall be tested for continuity and circuit integrity. Adjustments shall be made for circuits not complying with testing criteria.

D. All test reports, including copies of any required Energy Code Acceptance Forms (e.g. CA Title 24 Acceptance for Code Compliance Forms) should be submitted to the Engineer at completion of project.

1.6 IDENTIFICATION

A. Nameplates shall be provided for unit substations, switchgear, switchboards, distribution boards, distribution panels, panel boards, motor control centers, transformers, transfer switches, contactors, starters, disconnect switches, enclosed circuit breakers/switches, Inverters, UPSs, PDUs, RDCs, Lighting Control Panels, Dimming Panels, Door Releasing System Panels, Fire Alarm / Central Monitoring terminal cabinets/power supplies/control panels, and all low voltage system terminal & control cabinets. Nameplate inscriptions shall be identical to the equipment designations indicated in plans and specifications.

All circuit breakers/fuses in switchgear, switchboards, distribution boards, distribution panels, UPS output circuit breakers, PDU output circuit breakers and motor control centers shall have individual nameplates located immediately adjacent to the respective device. Nameplate inscription shall identify the downstream equipment or device served by the circuit breaker or fuse.

Nameplates for contactors, starters, disconnect switches, and enclosed circuit breakers shall be engraved with the device designation/identification on the top line, source identification for the device on the 2nd line and load designation for the device on the bottom line. Where device designation is not indicated on plans/specifications, Contractor shall submit a written clarification request to the Engineer.

B. Identification nameplates, UON, shall be laminated 1/8" thick micarta with beveled edges and engraved white letters 3/8" high, minimum, on 1-1/2" high black background for single line of text. Where two lines of text are required, provide min. 2" high nameplate. Where three lines of text are required, provide min. 2.5" high nameplate.

C. Identification nameplates for new switchgear, switchboards, distribution boards, distribution

panels, panel boards & motor control centers shall be attached with switchgear manufacturer-provided screws via switchgear manufacturer factory pre-drilled holes. A factory option to rivet identification nameplates to the equipment is only acceptable if screw-fastened nameplates are not an available option from the switchgear manufacturer. Field drilling or other mechanical attachment methods that change/void the NEMA or NTRL rating of the enclosure are strictly forbidden.

D. Identification nameplates for transformers, transfer switches, disconnect switches, enclosed circuit breakers/switches, Inverters, UPSs, PDUs, RDCs, Lighting Control Panels, Dimming Panels, Door Releasing System Panels, Terminal cabinets and all circuit breakers/fuses in switchgear, switchboards, distribution boards, distribution panels, UPS output circuit breakers, PDUs, PDU output circuit breakers, and motor control centers shall be attached to the equipment by self-adhesive backing integral to the nameplates. When equipment is located outdoors, provide nameplates without self-adhesive backing and attach to equipment using weather-rated, UV- resistant epoxy. In all cases, clean surfaces before applying identification nameplates parallel to equipment lines.

E. Warning Placards, as required by General Single Line Diagram Notes for multiple power sources, or Instruction Placards, as required for all kirk-key interlock schemes, all UPS bypass procedures or as required elsewhere in the plans/specifications shall be self-adhesive, 1/8" thick micarta with beveled edges, engraved 1/2" high white lettering on a Red background. Warning/Instruction Placards shall be attached to the face of the equipment directly related to the placards. Provide a formal placard submittal for review by the Engineer prior to ordering any Warning/Instruction Placards. In all cases, clean surfaces before applying Warning/Instruction Placards parallel to equipment lines.

F. Receptacles that are part of a UL-listed under floor computer room whip assembly, ceiling and/or cable/ladder tray-mounted receptacles used in lab, manufacturing, commercial kitchen environments or that are serving telcom/data/av racks & cabinets shall have identification nameplates located on the wiring device plate cover. Nameplates shall be self-adhesive, 1/8" thick micarta with beveled edges, engraved 1/4" high white lettering on black background with serving power source, circuit identification and NEMA/IEC receptacle type. Use of two (2) separate nameplates per device plate cover is acceptable. Affix nameplates to be visible when plugs are occupying receptacles.

G. See wiring device section of this specification for additional wiring device plate cover labeling requirements.

H. See drawings for panel board schedule directory installation requirements.

I. See conduit installation section of this specification for conduit labeling requirements.

1.7 FINAL INSPECTION AND ACCEPTANCE

A. After all requirements of the Specifications and/or the Drawings have been fully completed, representatives of the Owner will inspect the work. Contractor shall provide competent personnel to demonstrate the operation of any item or system to the full satisfaction of each representative.

B. Final acceptance of the work will be made by the Owner after receipt of approval and recommendation of acceptance from each representative.

1.8 RECORD DRAWINGS

A. Drawings of Record: The Contractor shall provide and keep up-to-date, a complete record set of drawings. These shall be corrected daily and show every change from the original Drawings. This set of prints shall be kept on the job site and shall be used only as a record set. This shall not be construed as authorization for the Contractor to make changes in the layout without definite instruction in each case. Upon completion of the work, a set of reproducible Contract Drawings shall be obtained from the General Contractor and all changes as noted on the record set of prints shall be incorporated thereon with black ink in a neat, legible, understandable and professional manner. Refer to the Supplementary General Conditions for complete requirements.

1.9 APPROVALS, EQUALS, SUBSTITUTIONS, ALTERNATIVES, NO KNOWN EQUAL

A. Approvals: Where the words (or similar terms) “approved”, “approval”, “acceptable”, and “acceptance” are used, it shall be understood that acceptance by the Owner, Architect and Engineer are required.

B. Equal: Where the words (or similar terms) “equal”, “approved equal”, “equal to”, “or equal by”, “or equal” and “equivalent” are used, it shall be understood that these words are followed by the expression “in the opinion of the Owner, Architect, and Engineer”. For the purposes of specifying products, the above words shall indicate the same size, made of the same construction materials, manufactured with equivalent life expectancy, having the same aesthetic appearance / style (includes craftsmanship, physical attributes, color and finish), and the same performance.

C. Substitution: For the purposes of specifying products “substitution” shall refer to the submittal of a product not explicitly approved by the construction documents / specifications.

1. Substitutions of specified equipment shall be submitted and received by the Engineer ten (10) days prior to the bid date for review and written approval. Regulatory Agency approval for all substitutions will be the sole responsibility of the Contractor. To receive consideration, requests for substitutions must be accompanied by documentary proof of its equality with the specified material. Documentary proof shall be in letterform and identify the specified values/materials alongside proposed equal values/materials. In addition, catalog brochures and samples, if requested, must be included in the submittal. ONLY PRE-BID APPROVED PRODUCTS, ISSUED VIA A FORMAL BID ADDENDUM TO ALL BIDDERS, WILL BE ALLOWED ON THE PROJECT. REGARDLESS OF THE APPROVAL ON ANY SUBSTITUTION, ALL BIDS SHALL BE BASED ON THE PRODUCTS EXACTLY AS SPECIFIED. PRICING FOR EACH APPROVED SUBSTITUTION SHALL BE INCLUDED IN THE BID SUBMITTAL AS A SEPARATE LINE ITEM.
2. In the event that written authorization is given for a substitution, after award of contract, the Contractor shall submit to the Engineer quotations from suppliers / distributors of both the specified and proposed equal material for price comparison, as well as a verification of delivery dates that conform to the project schedule.
3. In the event of cost reduction, the Owner will be credited with 100 percent of the reduction, arranged by Change Order.
4. The Contractor warrants that substitutions proposed for specified items will fully perform the functions required.

D. Alternates \ Alternatives: For the purposes of specifying products, “alternatives / alternates” may be established to enable the Owner / Architect / Engineer to compare costs where alternative materials or methods might be used. An alternate price shall be submitted in addition to the

base bid for consideration. If the alternate is deemed acceptable, written authorization will be issued.

E. No Known Equal: For the purposes of specifying products, "No Known Equal" shall mean that the Owner / Architect / Engineer is not aware of an equivalent product. The Contractor will need to submit a "Substitution" item, per the requirements listed above, if a different product is proposed to be utilized.

1.10 SHOP DRAWINGS / SUBMITTALS

A. Shop Drawings / Submittals shall be submitted in six (6) bound sets accompanied by Letter of Transmittal, which shall give a list of the number and dates of the drawings submitted. Drawings shall be complete in every respect and bound in sets.

B. The Shop Drawings / Submittals submitted shall be marked with the name of the project, numbered consecutively and bear the approval of the Contractor as evidence that the Contractor has checked the Drawings. Any Drawings submitted without this approval will be returned to the Contractor for resubmission.

C. If the shop drawings show variations from the requirements of the Contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variations in the Contractor's letter of transmittal. If the substitution is accepted, the Contractor shall be responsible for proper adjustment that may be caused by the substitution. Samples shall be submitted when requested.

D. Only products listed as "Equal" within the contract documents, along with formally approved "Substitutions" will be reviewed. Products not conforming to these items will not be reviewed and will be returned to the Contractor for re-submittal.

E. Review comments used in response to shop drawings / submittals are:

- "No Exception Taken" — Product approved as submitted.
- "Furnish As Corrected" — Re-submittal not required, although the Contractor shall provide the submitted product with corrections as noted.
- "Revise And Resubmit" — Re-submittal required with corrections as noted.
- "Rejected" — Re-submittal required based upon the originally specified product.

F. Shop drawings shall be submitted on the following but not limited to:

- Lighting Fixtures, Lamps and Ballasts.
- Switchgear, Switchboards, Distribution Boards, Motor Control Centers, Panel boards, and Bus Ducts; complete with overcurrent device information.
- Transformers.
- Fire alarm System/Central Monitoring System.
- Wiring Devices.
- Lighting Control System / Dimming System Products.
- Pullboxes and Underground Vaults
- Terminal Cabinets
- Lighting Inverters, UPSs, RDCs, PDUs, Generators, Transfer Switches, TVSS

Systems
- Cable Tray, Flexible Cable tray and Cable Runway
- Power Poles and Floor Boxes
- Arc Flash, Short-Circuit & Coordination studies
- All other products called out on drawings that call for shop drawing submittal.

1.11 MAINTENANCE, SERVICING, INSTRUCTION MANUALS AND WIRING DIAGRAMS

A. Prior to final acceptance of the job, the Electrical Contractor shall furnish to the Owner at least four (4) copies of operating and maintenance and servicing instructions, as well as four (4) complete wiring diagrams for the following items or equipment:

- Lighting Control System / Dimming Systems.
- Fire alarm system.
- Transformers.
- Switchgear, Switchboards, Distribution Boards, Motor Control Centers, Panel boards, and Bus Ducts; complete with over current device information.
- Lighting Inverters, UPSs, PDUs, Generators, Transfer Switches, TVSS Systems

B. All wiring diagrams shall specifically cover the system supplied. Typical drawings will not be accepted. Four (4) copies shall be presented to the Owner.

1.12 INTERRUPTION OF SERVICE OR SERVICE SHUTDOWN:

A. Any interruption of electrical services, electrical circuits, electrical feeders, signal systems, communication systems, fire alarm systems, etc. required to perform work shall meet the specific prior-approval requirements of the Owner. Such work shall be scheduled with the Owner to be performed at the Owner's convenience.

B. Interruptions/outages of any of the Owner’s systems and services mentioned above shall be scheduled to occur during other than the Owner’s normal business hours. Any overtime costs shall be borne by the Contractor.

C. See drawings for any additional requirements regarding outages, interruption and any temporary services required.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials and Equipment: All electrical materials and equipment, including custom-made equipment, shall be new and shall be listed by Underwriter's Laboratories (UL) and bear their label or be listed and certified by a Nationally Recognized Testing Lab (NTRL) that is also recognized by the local Authority-Having-Jurisdiction (AHJ).

B. Switchgear /Switchboards / Distribution Boards / Motor Control Centers:

1. See general single line notes on single line drawing for more information.

C. Panel boards - Branch Circuit:

1. See drawings for requirements and panel board schedules; and Specification Section 26

24 16 for additional requirements.

D. Lighting Fixtures:

1. See drawings for lighting fixture and lamp schedules and additional specifications. Furnish, install and connect a lighting fixture at each outlet where a lighting fixture type symbol (designated on plans) is shown as being installed. Each fixture shall be complete with all required accessories including sockets, glassware, boxes, spacers, mounting devices, fire rating enclosure and lamps.
2. LED Drivers: See lighting fixture schedule notes. All noisy driver shall be replaced at no cost to the Owner.
3. Lamps: See lamp / fixture schedule and lamp / lighting fixture schedule notes.

E. Wiring Devices:

1. Provide wiring devices indicated per plan. Devices shall be specification grade. Acceptable manufactures are Leviton, Arrow-Hart and Hubbell. Provide all similar devices of same manufacturer, unless indicated otherwise. All device colors shall be from the full range of manufacturer standard color options as selected by the Architect. This selection will be made during the shop drawing review process
2. Receptacles:

a. Duplex receptacles shall be specification grade, 20 amperes, 125 volts, 3 wire, side wired with binding screws, parallel slots, U-ground, plaster ears and captive mounting screws. Body shall be phenolic, plastic or bakelite. Receptacles shall be heavy duty, 3-blade current carrying contacts and double wide flat blade ground contacts. Receptacles shall be Arrow-Hart 5242-I, Hubbell 5242-I or Leviton 5242-I or approved equal.
b. Single receptacles shall be specification grade, grounding type, side wired, with binding screws, receptacles shall have standard size ivory bakelite base. For circuits consisting of one single receptacle only, ampere rating of receptacle shall be the same as circuit breaker or fuse. 20 ampere, 125 volt receptacles shall be NEMA 5-20R, Arrow-Hart 5721-I.
c. Kiln receptacles and range receptacles shall be 3-pads, 4-wire, grounding type, rated 50 amperes at 125/250 volts, polarized, Arrow-Hart #5754, and shall be provided with a 2-gang, stainless steel plate, Arrow-Hart #9336.
d. Dryer receptacles shall be 3-wire, non-grounding type, rated 30 amperes at 125/250 volts, polarized, with "L" shaped and angled straight contacts and ivory bakelite baselite base, Arrow-Hart #9344N with a 2-gang stainless steel plate Arrow-Hart S703.
e. Ground fault interrupter type receptacles shall consist of a single receptacle and reset device manufactured in a standard configuration for use with a duplex plate. Receptacles shall be feed-thru, 20 ampere, NEMA 5-20R, ivory in color and shall be Leviton 6399-I, or equal. Exterior mounted receptacles shall be weatherproof.
f. Tamper resistant receptacles shall be 20 amp, 125 volts, Hubbell Cat. No. HBLSG62HI, Nema 5-20R.

F. Switches:

1. Local Switches:

a. Local switches shall be tumbler type, specification grade, rated 20 amperes at

120-277 volts AC only, with plaster ears, binding screws for side wiring, and standard size composition cups which fully enclose the mechanism. Switches shall be approved for use at currents up to the full rating on resistive, inductive, tungsten filament lamp and fluorescent lamp loads, and for up to 80% of the rating for motor loads. Switches shall be single pole, double pole, 3-way, 4-way, non-lock type. Non-lock type switches shall have ivory handles, and switch shall be Hubbell HBL 1221-I single pole, HBL 1222-I double pole, HBL 1223-I 3-way, and HBL 1224-I 4-way.

b. All lock type switches shall have metal or nylon key guides with ON/OFF indication, and shall be operable by the same key. Key switches shall be Hubbell1209

c. Rotary lock switches shall incorporate a tumbler type lock to prevent unauthorized operation. Lock shall be tumbler type by P & F Corbin, keyed to a HH41 key. Lock switch shall be installed with pin tumblers facing downward. Key shall be removable in all positions. Each device shall be complete with 2 keys. Keys shall be delivered only to the District's Electrical Inspector. Switches shall be rated at 20 amperes, 120-277 volt AC. Switches shall be as follows: single pole switches shall be Arrow-Hart 1191; double pole switches shall be Arrow-Hart 1192; 3-way switches shall be Arrow-Hart 1193. Switch plates shall be of stainless steel, engraved with "ON" and "OFF" positions. Switch plates shall be Arrow-Hart 1187. For switch plates of 2 or more gangs, provide special order plates equal to the single gang plate.

d. Pilot light switches shall be rated 20 amps and shall conform to the specifications for "local switches". The switches shall have red, rugged "Lexan" handles that are lighted by long-lasting neon lamps. Pilot light shall light when load is on. Single pole, 120 volt switches shall be Hubbell HBL1221-PL. Single pole, 277 volt switches shall be Hubbell HBL1221-PL7.

e. Remote control switches for mechanically held contactors arranged for 3-wire control shall be tumbler type, momentary contact, single pole, 3-position with center "OFF", rated 20 amperes at 120-277 volts AC only, with plaster ears, binding screws for side wiring, standard size composition cups which fully enclose mechanism, and ivory handles; Hubbell HBL1556-I.

2. The following device plates shall be engraved:

a. Key operated switches, switches with Pilot Lights and Switches for the control of motors, heaters and ventilators. Engraving shall be black and occur on the exposed side of the plate and indicate the motor, heater, or ventilator controlled.

b. Receptacles on generator and/or UPS power shall have custom stamped plates with the words “Generator” or “UPS” in black letters.

3. Weatherproof Outlet Covers/Assemblies. All Receptacles identified as weatherproof on the drawings shall be GFCI type and equipped as follows:

a. Subscript WP-A: Recessed wall box, 6” x 6”x 5 ½” deep, with a hinged, lockable, cast aluminum, self-closing, gasket-equipped door that is wet location-listed raintight while-in-use. Unit shall comply with NEC, or CEC where adopted, Article 406.8(A) and (B). C.W. Cole TL-310-9-GFI-PH-MOD-CUSTOM COLOR Series with an interior metal plate suitable for a GFCI receptacle in one compartment separated from a second compartment with a metal separation barrier. The second compartment shall have a blank metal plate suitable for field installation of power, AV or communications devices.

This compartment shall have a minimum ¾" C.O. with pull string routed from the box to the facility telephone backboard unless otherwise noted on the drawings. Provide 1 key minimum per device to the Owner's project manager upon completion of project. Include all costs for custom color powder coat finish as selected by Architect.

b. Subscript WP-B: Wet location-listed raintight while-in-use cast copper-free aluminum lockable cover with baked aluminum lacquer finish and one gang GFCI receptacle. Hubbell WP26M series. Polycarbonate covers are unacceptable. Unit shall comply with NEC, or CEC where adopted, Article 406.8(A) and (B). Contractor shall field paint custom color as selected by Architect.

c. Subscript WP- C: Single Service BK Lighting #CUS-1204-46 raintight while-in-use cast copper-free aluminum lockable cover with baked aluminum lacquer finish and one-gang GFCI receptacle. Hubbell WP26M series or equal. Polycarbonate covers are unacceptable. Wet location-listed weatherproof cover shall comply with NEC, or CEC where adopted, Article 406.8(A) and (B). Contractor shall provide custom color by manufacturer as selected by Architect. See drawings for additional details.

d. Subscript WP-D: Dual Service BK Lighting #CUS-1204-47 with raintight while-in-use cast copper-free aluminum lockable cover(s) with baked aluminum lacquer finish, internal barrier, one gang GFCI receptacle and one gang telecommunications outlet. Hubbell WP26M series. Polycarbonate covers are unacceptable. Wet location-listed weatherproof cover(s) shall comply with NEC, or CEC where adopted, Article 406.8(A) and (B). Contractor shall provide custom color by manufacturer as selected by Architect. See drawings for additional details.

G. Motor Controllers / Starters: See drawings for motorized equipment schedules and specifications.

H. Circuit Breakers:

1. Service entrance circuit breakers smaller than 400 Amp frame shall be thermal-magnetic trip with inverse time current characteristics unless otherwise indicated below. Service entrance main circuit breakers, 400 Amp frame and larger shall be 100% rated, solid-state type as outlined in this specification. All other service entrance circuit breakers, 400 Amp frame and larger, shall be 100% rated, solid-state type as outlined in this specification.

2. All non-service entrance circuit breakers 225 Amp and larger shall be thermal magnetic type and have continuously adjustable magnetic pick-ups of approximately 5 to 10 times trip rating. Breakers shall have easily changed trip rating plugs with trip ratings as indicated on the Drawings. Rating plugs shall be interlocked so they are not interchangeable between frames. Additionally, all non-service entrance circuit breakers, 600 Amp frame and larger, located in 480v 3 phase, 3-wire or 277/480v, 3 phase 4-wire switchgear, distribution boards or panel boards, shall be solid state, 100% rated. Breaker shall have built-in test points for testing long delay and instantaneous, and ground fault (where shown) functions of the breaker by means of a 120-volt operated test kit. Contractor shall utilize a test kit capable of testing all breakers 400 Amp and above - at the Engineer's request.

3. All non-service entrance circuit breakers less than 225 Amp shall be molded plastic case, air circuit breakers conforming to UL 489. Provide breakers with thermal magnetic trip units, and a common trip bar for two- or three-pole breakers, connected

internally to each pole so tripping of one pole will automatically trip all poles of each breaker. Provide breakers of trip-free and trip-indicating bolt-on type, with quick-make, quick-break contacts. Provide single two- or three-pole breaker interchangeability. Provide padlocking device for circuit breakers as shown on the Drawings.

4. Where a Current Limiting Circuit Breaker (CLCB) is indicated on drawings or as required elsewhere in this specification, provide a U.L. listed current limiting thermal magnetic circuit breaker(s) u.o.n. An independently operating limiter section within a molded case is not allowed. Coordinate CLCB ratings as required to protect electrical system components on the load side of the CLCB to include, but not limited to, protecting automatic transfer switches, panel boards and lighting control panels.
5. Where a solid-state circuit breaker is indicated on drawings or as required elsewhere in this specification, provide a solid-state circuit breaker with minimum five function complete with built-in current transformers. The five functions shall be independently adjustable and consist of Overload/Long Time Amp Rating, Long Time Delay, Short Time Delay, Short Circuit/Instantaneous Pickup, but may also include Shunt Trip and/or Ground Fault if so indicated on the Drawings. Rating plugs shall be interlocked so they are not interchangeable between frames. Breaker shall have built-in test points for testing long delay and instantaneous, and ground fault (where shown) functions of the breaker by means of a 120-volt operated test kit. Contractor shall utilize a test kit capable of testing all breakers 400 Amp and above - at the Engineer's request
6. Ground Fault Interrupting Breakers. Provide with molded plastic case, air circuit breakers, similar to above with ground fault circuit interrupt capability, conforming to UL Class A, Group 1.
7. Arc Fault Interrupting Breakers. Provide with molded plastic case, air circuit breakers, similar to above with arc fault circuit interrupt capability, conforming to UL 1699 & UL Class A, Group 1. Provide on all-dwelling unit circuits supplying bedrooms, sleeping quarters etc as required to comply with NEC, or CEC where adopted, Article 210.12(B)
8. Tandem or half-sized circuit breakers are not permitted.
9. Series Rated Breakers. UL listed series rated combinations of breakers can be used to obtain panelboard-interrupting ratings shown on Drawings. If series rated breakers are used, switchboards, distribution boards and panel boards shall be appropriately labeled to indicate the use of series rated breakers. Shop drawing submittal shall include chart of U.L. listed devices, which coordinate to provide series rating
10. Circuit breakers shall be standard interrupting construction. Panelboard shall accept standard circuit breakers up to 225 amperes.
11. Circuit breaker handle accessories shall provide provisions for locking handle in the on or off position.
12. Shunt trip equipped circuit breakers shall be provided on all elevator feeders.
13. Temperature compensating circuit breaker(s) shall be provided when located in outdoor enclosure(s) or when located in an enclosure subject to high ambient heat due to nearby industrial processes etc.
14. Provide 75 degree Celsius-rated conductor lugs/lug kits as required on all circuit breakers to accept conductor quantities and sizes shown on drawings.
15. All circuit breaker terminations shall be suitable for use with 75 degrees Celsius ampacity conductors.

I. Disconnect Switches:

1. Non-fusible or fusible, heavy-duty, externally operated horsepower-rated, 600V A.C. Provide NEMA 3R, lockable enclosures for all switches located on rooftops, in wet or damp areas and in any area exposed to the elements.

2. Fusible switches shall be Class "R".
3. Amperage, Horsepower, Voltage and number of poles per drawings- all of which shall be clearly marked on the switch nameplate.
4. Provide the Owner's project manager with one (1) spare set of fuses and two (2) sets of fuse clips/fuses for every set of fuses on the project.

J. Fuses:

1. Provide fuses at all locations shown on the Drawings and as required for supplemental protection.
   a. Fuses shall be manufactured by Bussman, Shawmut, or equal.
   b. All fuses shall be the product of a single manufacturer.
2. Main and Feeder Protection.
   a. Where rating of protective device is greater than 600A, provide Bussman Hi-Cap fuses, Class L, current limiting, having an interrupting rating of 200,000A RMS.
   b. Where rating of protective device is 600A or less, provide Bussman Class RK series current limiting fuses, having an interrupting rating of 200,000A RMS.
3. Motor Protection.
   a. Where rating of protective device is greater than 600A, provide Bussman Hi-Cap fuses, Class L, current limiting, having an interrupting rating of 200,000A RMS.
   b. Where rating of protective device is 600A or less, provide Bussman Class RK series current limiting fuses, having an interrupting rating of 200,000A RMS.
   c. Where fuses feeding motors are indicated but not sized, it shall be the responsibility of the Contractor shall coordinate the fuse size with the motor to provide proper motor running protection.
   d. When rejection type fuses are specified (Class RK series) the fuse holder of all switches (specified in other Sections) shall be suitable for the fuses provided.

K. Cable Tray, Flexible Cable Tray and/or Cable Runway:

1. See drawings for Cable Tray, Flexible Cable Tray and/or Cable Runway specifications.

L. Lighting Control / Dimming Systems:

1. See drawings for lighting Control and/or Dimming Systems schedules and specifications.
2. Wall box dimmers shall be rocker-type as manufactured by Lutron - no known equal. Dimmers and dimmer faceplates shall match the color of adjacent switches and faceplates. Dimmers and dimmer faceplates in wood finished areas shall generally be black unless otherwise indicated by the Architect. The Contractor shall obtain written approval of the Architect regarding final dimmer and dimmer faceplate color selection prior to ordering material. Multiple dimmers/switches shall be ganged together with a common cover plate. Provide dimmers as follows.
   a. Incandescent: Lutron DIVA DV-10P or DV-103P (3-way) (1000 Watt max.)
   b. Electronic Low Voltage: Lutron DIVA DVELV-300P or DVELV-303P-(3-way) (300 Watt)
   c. Magnetic Low Voltage: Lutron DIVA DVLV-10P or DVLV-303p (3-way) (800 Watt max.)
   d. Fluorescent (3-Wire): Lutron DIVA DVF-103P (single/3way, 8A @ 120v) or DVF-103P-277 (single/3way, 6A @

277v)

e.	Fluorescent (0-10V):	Lutron DIVA MW-DV.
f.	Fluorescent (LutronTu-Wire):	Lutron DIVA DVFTU-5A3P with Lutron H.P. module where required.
g.	Fan Control:	Lutron DIVA DVFSQ-F (1.5A @ 120V. max, 3 speed, single pole, 3-way)

Contractor shall verify if dimmer(s) requires derating when ganged. Provide Lutron H.P. module, Lutron Power Boosters, and/or Lutron Interfaces where required to accommodate loads higher than dimmers' standard or derated load carrying capacity. .

M. Fire Alarm System/Central Monitoring System:

1. See drawings for Fire Alarm System or Central Monitoring System specifications.

Q. Fire Alarm, Clock, Security Intrusion Detection, Public Address, and Telephone Systems wiring shall be continuous from terminal cabinets or from equipment to each device. Splices are not allowed between devices and/or terminal cabinets at junction and pull boxes. Wiring shall be terminated at approved terminal blocks only.

R. All systems of wiring shall be so installed that, when completed, systems will be free from short circuits and grounds, other than required grounds. Electrical contractor shall include in his bid cost of services an approved independent testing laboratory to test all feeders insulation resistance.

The tests to be performed are as follows:

1. With a megger insulation tester, use the time-resistance method (Sometimes referred to as absorption test) to test each feeder and branch circuit wire. Tests must be conducted with wire disconnected at each end in order to test the wire itself. A second test must be conducted with the wire connected at each end and the circuit breakers or switches in the closed positions.
2. Tests shall be performed in presence of the District Electrical Inspector.
   Three copies of the test results shall be submitted to the District Electrical Inspector. Test results shall be submitted on an official form from the independent testing laboratory showing project location, test engineer, test conditions, test equipment data, and final test results.

S. Outlet Boxes and Fittings:

1. Outlet boxes used in concealed work shall be galvanized steel, pressed or welded type, with knockouts
2. In exposed work, outlet boxes and conduit fittings required where conduit runs change direction or size, shall be cast metal with threaded cast hubs cast integral with box or fitting. Boxes and fittings shall not have unused spare hubs except as otherwise indicated or specified.
3. Fittings shall be cast metal and non-corrosive. Ferrous metal fittings shall be cadmium plated or zinc galvanized. Castings shall be true to pattern, smooth, straight, with even edges and corners, of uniform thickness of metal, and shall be free of cracks, gas holes, flaws, excessive shrinkage and burnt-out sand.

4. Covers for fittings shall be galvanized steel or non-corrosive aluminum and shall be designed for particular fitting used.

5. Light fixture outlets shall be 4" octagon, 4" square, 2 1/8" deep or larger, depending upon number of wires or conduits therein, and shall be equipped with 3/8" malleable iron fixture studs, and plaster rings. Plaster rings shall have round opening with 2 ears drilled 2-23/32" center to center.
6. For local switch outlets use 4" square 2 1/8" deep, boxes for single gang, 5" square boxes for two-gang, and special solid gang boxes with gang plaster ring for more than 2 switches.
7. For all receptacle, clock, bell, fire alarm pull station, speaker, thermostat, telephone, and data outlets, use 4" square, 2 1/8" deep boxes or larger, if necessary, with single gang plaster rings. For television outlets, use 4-gang deep boxes and 4-gang plaster rings.
8. Plaster rings shall be provided on all flush mounted outlet boxes except where otherwise indicated or specified. All plaster rings shall be same depth as finished surface.
9. In existing plywood wall or drywall construction, and where flexible steel conduit is fished into walls, one-gang and two-gang outlets for wiring devices may be sectional steel boxes with plaster ears. Boxes shall be fastened to plywood with a flat head screw in each plaster ear screw hole.
10. Factory made knock-out seals shall be installed to seal all box knock-outs which are not intact.
11. At each location where flexible conduit is extended from a flush outlet box, provide and install a weather-proof universal box extension adapter.

T. Junction and Pull-Boxes:

1. Junction and pull-boxes, in addition to those indicated, shall only be used where absolutely necessary with specific direction of the District's Electrical Inspector in each case.
2. Interior and non-weatherproof boxes shall be constructed of blue or galvanized steel with ample laps, spot welded, and shall be rigid under torsional and deflecting forces. Boxes shall have auxiliary angle iron framing where necessary to ensure rigidity. Covers shall be fastened to box with a sufficient number of brass machine screws to ensure continuous contact all around. Flush type boxes shall be drilled and tapped for cover screws at Site if boxes are not installed plumb. All surfaces of pull and junction boxes and covers shall be given one coat of metal primer, and one coat of aluminum paint.
3. Weatherproof pull and junction boxes shall conform to foregoing for interior boxes with following modifications: Cover of flush mounting boxes shall have a weather-tight gasket cemented to and trimmed even with cover all around. Surface or semi-flush mounting pull and junction boxes shall be UL approved as rain-tight and shall be complete with threaded conduit hubs. All exposed portions of boxes shall be galvanized and finished with a prime coat and coat of baked-on gray enamel.
4. All junction and pull-boxes shall be rigidly fastened to the structure and shall not depend on conduits for support.
5. Underground Concrete Pull Boxes:
   a. Precast Concrete Pull Boxes. Concrete pull boxes shall be traffic type, reinforced for H-20 Traffic bridge loading, Precast concrete. Pull boxes with inside dimensions 2'-0"x 3'-0" x 3'-0"D shall consist of a base section, top ring and cover. Base section shall have two 10"x10" knockouts in each 3'-0" side, and one 20"x20" knockout in each 2'-0" side. Pull boxes with inside dimension 4'-0 x 4'-0"x 4'-0"D shall consist of a base section, mid section, topping, and cover. Base section shall have two 8"x 16" knockouts on each of two opposite sides, and one 20" x 20" knockout on each of the other two opposite sides. All pull boxes shall have a minimum of 6" diameter sump knockout, and 1"

diameter ground rod knockout. In each pull box, furnish and install cable racks on walls. Each rack shall be equipped with 3 porcelain cable holders on a vertical steel mounting bar. Each pull box shall have 3/4" diameter pull irons. Covers shall be traffic type consisting of steel safety plate bolted to frame. Covers shall be marked "Electrical", "Power" "Telephone", "Signal" or "Ground", as required. Pull boxes shall be as manufactured by Quickset, or approved equal.

b. Provide end bells in all duct entrances. Terminate each metal conduit with insulated bushing having grounding terminal, O.Z. Type "Big".

c. Place pulling irons on opposite walls and below horizontal centerlines of ducts and bricked-up openings, and in bottom. Install pulling irons with each end hooked around a reinforcing bar.

d. Install a floor drain in every concrete pullbox into a sump containing 10 cubic feet of 1" crushed rock; minimum size 48" deep and 36" diameter. Provide 36" length of tile pipe extending down into the sump. Provide a grille over the top opening of pipe.

e. Install a 3/4" diameter, 10'-0" copperweld steel ground rod in every power concrete pull-box. Locate near a wall with 6" projection above floor for ground clamps. Permanently and effectively ground all metal equipment cases, cable racks, etc., in all pull boxes.

f. Provide a 6" deep sand base under each pull box.

g. Identify all power and signal cables by tagging in all manholes and pull boxes. Tie securely to cables with nylon cord or insulated type TW wire. Tie so that turns of wires do not form a closed electrical circuit.

h. Top of steel plate shall have a minimum coefficient of static friction of 0.5 for either wet or dry conditions, when tested for any shoe sole material. Testing and certification of the friction factor shall be conducted by an independent testing laboratory approved by the engineer, under the direction of a registered Civil or Quality Engineer. Testing shall conform to ASTM D1047 or F489 or F609, or other procedure approved by the Engineer.

6. Underground utility boxes shall be reinforced concrete with non-setting shoulders to prevent settlement following installation. Boxes shall be furnished with cast iron cover with finger hole, size as indicated on Drawings. Utility boxes shall be as manufactured by Quickset, or approved equal.

7. Manholes, vaults and pull-boxes required by utility company, and installed by Electrical Contractor, shall meet all requirements of utility company.

U. Plywood Backboards: Where indicated for telephone or communications system terminals or other equipment assemblies, provide backboards of size indicated. Use 3/4" thick x 8' tall (length per plans), Douglas Fir, void-free, kiln-dried, fire-rated plywood finished on one side and prime coat painted on all surfaces with finish coat of enamel paint, color by Architect. Leave one (1) fire-rating stamp/sheet exposed for inspection.

V. Terminal Cabinets:

1. Terminal cabinets shall be fabricated of hot dipped galvanized code gauge sheet metal for flush or surface mounting, complete with barriered sections, a door for each vertically barriered section and sizes as indicated on plan. Doors shall be hinged and lockable. Locks shall be keyed to match the branch circuit panelboards. Terminal cabinet trims shall match the branch circuit panels.

2. Provide each terminal cabinet with a full size plywood backboard.

3. Terminal cabinets shall be installed complete with full-length skirts of the same

construction and finish as the terminal cabinet.

4. Where mounted outdoors, terminal cabinets shall be NEMA 3R, weatherproof complete with gaskets and required sealant to prevent moisture from entering the terminal cabinet.
5. All terminal cabinets and terminal cabinet barriered sections shall be labeled by the cabinet or cabinet section use (i.e. CATV, Security, etc). Labels shall be Micarta type as specified elsewhere in these specifications. Unless otherwise noted, all termination blocks and cables shall be labeled per ANSI/EIA 606 standard.

W. Painting: Terminal cabinets, panels, junction boxes, pull boxes, etc., and conduit installed in public view shall be painted with colors selected by the Architect to match the subject surface. Refer to painting section of the specifications for additional requirements.

X. Seismic Design and Anchoring of Electrical Equipment:

1. Seismic Protection Criteria: All Electrical and Mechanical machinery installations provided, as part of this contract located in any Seismic Risk Zone of the Uniform Building Code Seismic Risk Map shall be protected from earthquakes in accordance with the International Building Code and, as applicable, the state and local building codes and regulations. Protection criteria for these zones shall be a Horizontal Force Factor as prescribed by the IBC, or locally adopted building codes, multiplied by the machinery weight considered passing through the machinery center of gravity in any horizontal direction. Unless vibration isolation is required to protect machinery against unacceptable structure transmitted noise and/or vibration, machinery shall be protected from earthquakes by rigid structurally sound attachment to the load supporting structure. The force factor and anchorage shall be determined by calculations performed and submitted to the Architect by a professional engineer registered in state where the work is being performed (civil or structural) hired by the Contractor. The Contractor shall be responsible for the design of seismic restraint systems for all pieces of equipment weighing over 50 pounds including but not limited to the following:
   a. Switchgear, Switchboards, Distribution Boards, Motor Control Centers, and Panel boards.
   b. Conduits/Conduit support trapezes
   c. Transformers
   d. Light Fixtures
   e. Inverters, UPSs, RDCs, PDUs, Generators, Transfer Switches
   f. Cable Tray, Flexible Cable Tray, Ladder Tray
   g. Bus Duct
2. Seismic protection, labor, materials and design shall be included in the Contract sum.

Y. Trenching and Backfilling: Contractor shall be responsible for trenching and backfilling. Refer to Trenching and Backfilling section of the specifications for complete requirements.

PART 3 - EXECUTION

3.1 PREPARATION AND INSTALLATION

A. Installation of Conduit and Outlet Boxes:

1. All conduit installed in the dry walls or ceilings of a building shall be steel tube (EMT), aluminum tube (EMT), or Intermediate Metal Conduit (IMC). Flexible conduit shall not be used in lieu of EMT, IMC or rigid conduit except as noted herein.

2. Galvanized rigid conduit (GRC) or intermediate metal conduit (IMC) shall be used as follows:

   - when noted on the drawings.
   - when considered exposed to damage by the local AHJ.
   - when installed in wet or damp locations and of a trade size where listed-raintite fittings, connectors, couplings etc. are unavailable.
   - when required by NEC or CEC Article 517.13.
   - when installed in concrete and masonry. The use of ENT in CMU walls and parking structures may be allowed only as directed in writing by the Engineer. Request for ENT substitution must be made prior to bid and in accordance with pre-bid substitution requests requirements of these specifications.

3. Intermediate metal conduit (IMC), is approved for use in all locations as approved for GRC or EMT and in accordance with NEC, or CEC where adopted, Article 342.
4. Flexible steel conduit shall only be permitted to be used at light fixture outlets and connections to vibrating electrical equipment. All flexible steel conduit runs shall be less than 6'-0". All outdoor installation shall be made using liquid-tight flex with approved fittings. Include a separate insulated green ground conductor sized per NEC in each conduit. Other uses of flexible conduit shall be allowed only as approved in writing by the Engineer.
5. Flexible liquidtight conduit shall be installed in lieu of the flexible steel; where required by the NEC, or CEC where adopted, in damp and wet location, where exposed to weather, in refrigerated area (65°F or less), and/or between seismic joints. All rotating electrical equipment shall be supplied with flexible, liquid-tight conduit with appropriate slack and shall not exceed thirty-six (36) inches. Include a separate insulated green ground conductor sized per NEC in each conduit. Other uses of liquidtight flexible conduit shall be allowed as approved in writing by the Engineer on a case by case basis.
6. Rigid metallic conduit installed underground or embedded in concrete shall be 1" trade size minimum and shall be wrapped with 20 mil polyvinyl chloride plastic tape, PVC conduit installed underground or embedded in concrete shall be 3/4 " minimum trade size.
7. Where required for providing an Electrical Circuit Protective System to comply with NEC, or CEC where adopted, Articles 695 and 700, utilize UL listed 2-hour fire-rated, RHH-RHW conductors in conduit.
8. Conduit shall be run so as not to interfere with other piping fixtures or equipment.
9. The ends of all conduits shall be cut square, carefully reamed out to full size and shall be shouldered in fitting.
10. No running threads will be permitted in locations exposed to the weather, in concrete or underground. Special union fittings shall be used in these locations.
11. Where conduit is underground, under slabs or grade, exposed to the weather, or in wet locations, make joints liquid tight and gas tight.
12. All metal conduit in masonry and concrete and where concealed under floor slabs shall have joints painted with thread compound prior to makeup.
13. PVC conduit shall not be run in walls.
14. Where conductors enter a raceway or a raceway in a cabinet, pull box, junction box, or auxiliary gutter, the conductors shall be protected by a plastic bushing type fitting

providing a smoothly rounded insulating surface.

15. Where conduit extends through roof to equipment on roof area, this Contractor shall provide flashing material compatible with the roofing system as required by the roofing specifications or as required by the Owner's roof warranty. This flashing shall be delivered to the roofing contractor for installation. The actual location of all such roof penetrations and outlets shall be verified by the Architect/Owner. Contractor shall verify type of flashing prior to bid and include all costs.
16. All conduit shall be supported at intervals not less than 6'-0" and within 12" from any outlet and at each side of bends and elbows. Conduit supports shall be galvanized, heavy stamped, two-hole conduit clamp properly secured.
17. Where conduit racks are used the rack shall consist of two piece conduit clamps attached to galvanized steel slotted channels, properly secured via threaded rods attached directly to the building structure.
18. Nail-in conduit supports, one-piece set screw type conduit clamps or perforated iron for supporting conduit shall not be used.
19. Seismic Conduit Support:

    a. All conduit shall be supported in such a manner that it is securely attached to the structure of the building. Attachment is to be capable of supporting the tributary weight of conduit and contents in any direction. Maximum spacing of support and braces are to be as follows:

CONDUIT SIZE	MAXIMUM SPACING
1/2" to 3"	6'-0"
3-1/2" to 4"	8'-0"

20. All conduit runs shall be installed parallel or perpendicular to walls, structural members, or intersection of vertical planes and ceilings. Field made bends and offset shall be avoided where possible. Crushed or deformed raceway shall not be installed.
21. Open knockouts in outlet boxes only where required for inserting conduit.
22. Locate wall outlet of the same type at same level in all rooms, except where otherwise noted.
23. Outlet boxes on metal studs shall be attached to metal hangers, tack welded or bolted to studs; on wood studs attachment shall be with wood screws, nails not acceptable.
24. Recessed boxes shall not be mounted back-to-back in any wall; minimum offset shall be 24 inches.
25. Junction Boxes that do not contain any device(s) shall be located in storage rooms, electrical closets, or above accessible ceilings, not in hard lid ceilings or other forms of inaccessible ceilings. Place boxes which must be exposed to public view in a location approved by the Owner's Project Manager. Provide covers or plates to match adjacent surfaces as approved by the Owner's Project manager.
26. Surface mounted pull boxes, terminal cabinets, junction boxes, panel boards etc., shall be attached to walls using appropriate screws, fasteners, backing plates, stud blocking etc., as detailed on Architectural and/or Structural drawings. If architectural and/or Structural drawings are not provided on the Project, Contractor shall provide all necessary mounting hardware and backing support to comply with local building code requirements and any additional requirements imposed by the local Authority-Having-Jurisdiction.
27. Except where below grade, sleeves shall be installed where conduit passes through masonry or concrete walls and shall be 24 gauge galvanized steel no more that 1/2" greater in diameter than the outside diameter of the conduit. When located in non-rated structures , caulk conduit sleeve with stone wool. When located in fire rated

structures, provide U.L. listed fire stopping system. See fire stopping section of this specification for additional requirements.

28. All boxes shall be covered with outlet box protector, Appleton SB-CK, or similar device / method to keep dirt / debris from entering box, conduit or panels. If dirt / debris does get in, it shall be removed prior to pulling wires.
29. All boxes installed outdoors shall be suitable for outdoor installations, gasketed, screw cover and painted as directed by the Architect with weatherproof paint to match building.
30. All conduit entries to outdoor mounted panels, cabinets, boxes, etc., shall be made using Myers "SCRU-TITE" hubs Series ST.
31. Provide nylon or a 1/8-inch O.D. polyethylene rope, rated at 250 pounds tensile strength, in all conduits more than 5 feet in length left empty for future use. Not less than 5 feet of rope shall be left at each end of the conduit. Tag all lines with a plastic tag at each end indicating the termination/stub location of the opposite end of the conduit.
32. All multiple conduit runs within suspended ceilings shall be suspended from building structure by means of unistrut hangers/racks, Conduit shall not be allowed to lay on ceiling or be supported from ceiling suspension wires or other suspension system. Support conduit to structure above suspended ceilings 8" minimum above ceiling to allow removal of ceiling tile. Maintain two-inch clearance above recessed light fixtures
33. All exposed conduits and support hardware shall be painted to match the finish of the wall or ceiling to which it is supported.
34. Where conduits or wireways cross seismic joints, provide approved flexible conduit connection or approved expansion/deflection fitting to allow for displacement of conduit in all three axes. Connection shall allow for movement in accordance with design of seismic joint. Non-flexible raceways crossing expansion joints or other areas of possible structural movement shall make provision for 3-way movement at such points by means of expansion/deflection fittings. Fittings shall be installed in the center of their axes of movement and shall not be deflected to make part of a conduit bend, or compressed or extended to compensate for incorrect conduit expansion/deflection fittings(s) complete with ground jumpers.
    Where necessary, provide approved expansion joints to allow for thermal expansion and contraction of conduit(s). Install expansion joints complete with ground jumpers.
35. Seal all conduits where termination is subject to moisture or where conduit penetrates exterior wall, floor or roof, in refrigerated areas, classified (hazardous areas) and as indicated on the drawings.
36. Except as otherwise indicated on the Drawings or elsewhere in these specifications, bends in feeder and branch circuit conduit 2 inches or larger shall have a radius or curvature of the inner edge, equal to not less than ten (10) times the internal diameter of the conduit. Except where sweeping vertically into a building where sweep radius equals ten (10) times conduit diameter, underground communications and building interconnect conduits 3 inches or larger shall have a minimum 12'-6" radius or curvature of the inner edge. For the serving utilities, radius bends shall be made per their respective specifications.
37. Tag all empty conduits at each accessible end with a permanent tag identifying the purpose of the conduit, footage end-to-end, and the location of the other end. In wet, corrosive outdoor or underground locations, use brass, bronze, or copper 16 gauge tags secured to conduit ends with #16 or larger galvanized wire. Inscribe on the tags, with steel punch dies, clear and complete identifying information.

38. The following additional requirements shall apply to underground conduits:
    a. Underground conduit shall be Schedule 40 PVC (polyvinyl chloride) unless

otherwise indicated elsewhere in these specifications or as required per NEC, or CEC where adopted Article 517.13.

b. In all cases, where any conduit(s) pass under a building slab or footing, the electrical contractor will provide a Bentonite clay or concrete barrier that conforms to the height and width of the trench excavation and is a minimum of 18" thick. In all cases, where conduit(s) pass thru a sleeve in a footing or other foundation element, the electrical contractor will provide a Bentonite clay or concrete barrier between the sleeve and the conduit(s) surrounding the conduit(s) for the entire depth of the sleeve. The barrier is required to prevent passage of moisture under or thru the slab or footing via the trench or sleeve.

d. Where underground conduit passes under a building slab, concrete encasement may not be required, except as required above, contact the Engineer for written direction prior to omitting any encasement.

e. Underground conduits, which terminate inside building(s) below grade, such as in a basement level, or which slope so that water might flow into interior building spaces, shall be sealed at the point of penetration with a modular conduit seal (Link-Seal or equal by Rox Systems). Conduit/conduit sealing system penetrations of waterproofing membranes/systems on existing structures shall be completely restored as required to maintain membrane/system manufacturer and installer warrantee for the installation. All conduits shall be provided with a 4% slope away from buildings. All conduits shall be installed such that the water cannot accumulate in the conduit and such that water drains into the nearest manhole, pull box or vault – not into the facility. In instances where grade changes or elevation differences prevent sloping of conduit away from a building into the nearest manhole, pull box or vault or where accumulation of water in a manhole, pull box or vault may result in water traveling into the facility, conduits shall be sealed internally at each end of each conduit using conduit sealing bushing, sized as required for the conductors contained within the conduit (O-Z Gedney #CSBG 100psig withstand or equal). In all cases, install plugs or caps in spare (empty) conduits at both ends of each conduit (Jackmoon or equal) able to seal both water and gas from entering the facility via the conduits.

. f. All conduits installed underground shall be entirely encased in concrete 3" thick on all sides with multiple conduits spaced not less than 1-1/2" apart, except where otherwise specified. Provide approved conduit spacers as required to prevent any deflection of conduits when concrete is placed and to preserve position and alignment of conduits in concrete. Conduits shall be tied to spacers. Anchors shall be installed to prevent floating of conduits during pouring of concrete. Red concrete shall be used to encase conduits of systems operating above 600 volts.

g. All underground conduits shall be buried to a depth of not less than 24" below finished grade to top of the concrete envelope, unless otherwise specified.

h. Assemble sections of conduit with approved fittings and stagger all joints. Cut ends of conduit shall be reamed to remove all rough edges. Joints in all conduits shall be made liquid-tight. All bends at risers shall be completely below surface where possible.

i. Two or more conduit runs in a common trench shall be separated by at least 1-1/2" of concrete. Electric conduit runs installed in a common trench with other utility lines shall be separated from such lines by at least 12" horizontally. Public telephone conduits shall be separated from electric conduits or other

utility lines by not less than 3" of concrete.

j. The District's Electrical Inspector shall be called to the site for approval of all underground installations before and during concrete pour. The Contractor shall demonstrate the usability of the underground raceways installed as part of this contract. a round, tapered, rigid mandrel shall be drawn through each run of conduit in the presence of the District Inspector, and utility company inspector where applicable, before and after pouring concrete. Mandrel shall be 6" in length minimum, and have a diameter which is within 1/4" of the diameter of the conduit to be tested. Contractor shall repair or replace any conduit(s) which will not readily pass the mandrel test.

k. Nonmetallic conduit installations shall comply with following additional requirements: All joints in PVC conduit shall be sealed by means of approved solvent-weld cement supplied by conduit manufacturer. All nonmetallic conduit bends and deflections shall comply with requirements of applicable electrical code, except that minimum radius of any bend or offset for conduits sized from 1/2" to 1-1/2" inclusive shall not be less than 24". All bends at risers and risers shall be rigid steel conduit. Radius of curve of any bend or offset, in nonmetallic conduit for public telephone system shall be not less than 10 times trade size of conduit, unless otherwise specifically approved by public telephone system.

l. Furnish and install a 6" wide polyethylene red underground barrier type 12" above full length of concrete "CAUTION ELECTRIC LINE BURIED BELOW".

m. All underground conduit systems for use by serving utility company shall meet all requirements of utility company.

B. Installation of 600-Volt Conductors:

1. All electrical wire, including signal circuits, shall be installed in conduit.

2. All circuits and feeder wires for all systems shall be continuous from over current protective device or switch to terminal or farthest outlet. No joints shall be made except in pull, junction or outlet boxes, or in panel or switchboard gutters.

   a. Utilize preinsulated "winged" spring type connectors, 3M Company "Performance Plus" #O/B or #R/Y as required for splices and taps in conductors #6 AWG and smaller. When a spring connector is used in an underground environment or when subject to moisture, utilize a 3M Company Scotchcast 3507G epoxy resin connector sealing pack to seal the spring connector.

   b. Wires #4 AWG and larger AWG shall be joined together as follows:

      i. When located in an underground environment or when subject to moisture, the splice shall be made with compression connector and sealed by a 3M, or equal, PST cold shrink connector insulator.

      ii. When located in an interior environment, the splice shall be made with an Ilsco or equal dual rated, insulated splice-reducer connector or multi-tap connector-listed for use with 75/90 degree Celsius rated conductors.

   c. Connections to busbar shall be made with dual-rated copper/aluminum one-piece compression lugs. Paralleled conductor connections shall be by mechanical lugs.

3. Thoroughly clean all conduit and wire-ways and see that all parts are perfectly dry before pulling any wires.

4. Install UL approved fixture wire from all lighting fixture lamp sockets into fixture outlet or junction box.

5. For 20 ampere branch circuit wiring, increase #12 conductors to #10 for 120 volt circuits longer than 100 feet and for 277 volt circuits longer than 150 feet.
6. Conductor Support. Provide conductor supports as required by codes and recommended by cable manufacturer. Where required, provide cable supports in vertical conduits and provide lower end of conduit with a ventilator.

C. Grounding / Bonding:

1. Provide grounding and bonding for entire electric installation as shown on plans, as listed herein and as required by applicable codes. Included, but not limited to, are items that require grounding / bonding:

   a. Conduit, Raceways and Cable Trays.
   b. Neutral or identified conductors of interior wiring system.
   c. Panel boards, Distribution Boards, Switchgear and Switchboards.
   d. Non-current carrying metal parts of fixed equipment.
   e. Telephone distribution equipment.
   f. Inverters, UPS, PDU, RDC, Transfer Switch and Generator Systems.
   g. Raised Flooring.
   h. Antennas.
   i. Lightning Protection Systems.
   j. Metal piping installed in or attached to a building/structure.
   k. Metallically isolated structural steel.
   l. Metallically isolated underground metal water piping.
   m. Elevator hydraulic piston/lift case.

2. In multi-occupancy buildings, Contractor shall bond metal water piping systems installed in, under or attached to a building and/or structure serving individual occupancies where the piping system(s) are metallically isolated from each other. Per NEC, or CEC where adopted Art. 250.104(A)(2) and (4), the bonding conductor shall be sized per Table 250.122 and connected to the switchboard/panelboard serving that suite/occupancy.
3. Use of Ground Rods: Furnish and install required number of 3/4" x 10' copper clad ground rods to meet specified resistance, all required grounding wires, conduit and clamps. The size of the grounding conductors shall be not less than that set forth in the latest edition of the California Code of Regulations, Title 24, State of California and NEC (CEC, where adopted), unless otherwise indicated. Rods shall be installed such that at least 10 feet of length is in contact with the soil. Where rock bottom is encountered, the electrode shall be driven at an oblique angle not to exceed 45 degrees from vertical or shall be buried in a trench that is at least 30 inches deep. The upper end of the electrode shall be flush with or below ground level unless the above ground end and the grounding electrode conductor attachments are protected against physical damage. Unless otherwise noted, connection to the grounding electrode conductor may be by compression type or exothermic process connector. Mechanical connectors shall not be used.
4. Grounding System Connection:

   a. Compression connectors shall be unplated copper, manufactured by Burndy, or approved equal, designed specifically for the intended connection.

   b. Exothermic weld-type connectors shall be 'Cadweld' manufactured by Erico Products, or approved equal, designed specifically for the intended connection.

c. Mechanical connectors shall not be used.

5. Isolated Ground Receptacles shall have an insulated ground wire connected between the receptacle and the panelboard isolated ground bus. Unless otherwise noted, this ground wire shall not be grounded at any other point, and shall be distinguished from other ground wires by a continuous yellow stripe.
6. Provide separate green equipment ground conductor in all electrical raceways, to effectively ground all fixtures, panels, controls, motors, disconnect switches, exterior lighting standards, and noncurrent carrying metallic enclosures. Use bonding jumpers, grounding bushings, lugs, busses, etc., for this purpose. Connect the equipment ground to the building system ground. Use the same size equipment ground conductors as phase conductors, up through #10 AWG. Use NEC (or CEC where adopted) Table 250.122 for conductor size with phase conductors # 8 and larger, if not shown on the Drawings.
7. Clean the contact surfaces of all ground connections prior to making connections.
8. Ductwork. Provide a flexible ground strap, No. 6 AWG equivalent, at each flexible duct connection at each air handler, exhaust fan, and supply fan, and install to preclude vibration.
9. Motors. Connect the ground conductor to the conduit with an approved grounding bushing, and to the metal frame with a bolted solderless lug. Bolts, screws and washers shall be bronze or cadmium plated steel.
10. Building grounding system resistance to ground shall not exceed 25 ohms.

D. Line Voltage and Low Voltage Power Supplies to all Mechanical Equipment Including Plumbing, Heating and Air Conditioning Units;

1. An electric power supply, including conduit, any necessary junction and/or outlet boxes and conductors and connection shall be furnished and installed by this Contractor for each item or mechanical equipment.
2. Power supplies to individual items of equipment shall be terminated in a suitable outlet or junction box adjacent to the respective item of equipment, or a junction box provided by the manufacturer or the equipment and directed by the Mechanical Contractor. Allow sufficient lengths of conductor at each location to permit connection to the individual equipment without breaking the wire run.
3. The location of all conduit terminations to the equipment is approximate. The exact location of these conduit terminations shall be located and installed as directed by the Mechanical and Plumbing Contractor.
4. Provide power supplies to all plumbing and mechanical equipment, including but not limited to, equipment furnished and installed by Owner or Contractor such as heating and air conditioning equipment, pumps, boilers, auto valves, water coolers, trap primers etc. The installation shall produce a complete and operable system.
5. Unless otherwise noted, this Contractor shall furnish and install all conduit, boxes, wires, etc., for line voltage wiring and low voltage wiring.
6. It is the Contractor's responsibility to verify with the Drawings of other trades regarding the extent of his responsibility for mechanical equipment. The bid must include a sum sufficient to cover the cost of the installation.
7. The location of all power supply connection and/or terminations to the mechanical equipment is approximate. The exact locations of these terminations shall be verified with other trades during construction.

E. Prefabricated Equipment: Installation of all prefabricated items and equipment shall conform to the requirements of the manufacturer's specifications and installation instruction pamphlets. Where code requirements affect installation of materials and equipment, the more stringent

requirements, code or manufacturer's instructions and/or specifications, shall govern the work.

F. Firestopping:

1. The Contractor shall be responsible for furnishing all material, labor, equipment, and services, in conjunction with the selection and installation of a complete and fully functioning and code compliant UL-listed fire stop assembly/system(s) as required by project conditions.
2. Each fire stop assembly/system shall have an "F" and/or "T" rating as required by each condition requiring fire stopping. Each fire stop assembly/system shall have a current U.L. listing, as indicated in the latest edition of the U.L. Fire Resistance Directory. Contractor shall verify acceptability of all fire stopping methods and system selections with the authority having jurisdiction prior to installation. The Contractor shall install each firestop assembly/system in accordance with the manufacturer's printed instructions.
3. Each fire stop assembly/system shall be labeled with fire stop manufacturer-furnished label on each side of the fire stopping systems depicting UL # etc.

G. Housekeeping Pads

1. Provide a minimum 3" high housekeeping pad above finished floor/finished grade for all exterior floor mounted switchgear, switchboards, distribution boards, transformers, motor control centers etc flush with the face of the equipment. Provide a minimum 3" high housekeeping pad for all floor mounted switchgear, distribution boards, transformers, motor control centers, transfer switches etc located in mechanical central plant(s) and other mechanical spaces flush with the face of the equipment. Confirm pad dimensions with local inspector prior to forming pad to ensure any local code interpretations/conditions regarding housekeeping pads are met.
2. Unless otherwise noted above, provide a minimum 1-1/2" high housekeeping pad above finished floor/finished grade for all interior floor mounted switchgear, switchboards, distribution boards, transformers, motor control centers, transfer switches etc flush with the face of the equipment. All housekeeping pad heights are as measured from finished floor or grade. Confirm pad dimensions with local inspector prior to forming pad to ensure any local code interpretations/conditions regarding housekeeping pads are met.
3. Provide a 1-1/2" high housekeeping pad above finished floor/finished for service equipment. Prior to pad rough-in, Contractor shall verify serving utility company's maximum meter height requirements and, if necessary, adjust height of housekeeping pad to comply with those requirements. In indoor applications, the pad shall be flush the face of the switchgear. In outdoor applications, the housekeeping pad shall extend a minimum of 4 feet from the front of switchgear/switchboard's weatherproof enclosure. Confirm pad dimensions with local inspector prior to forming pad to ensure any local code interpretations/conditions regarding housekeeping pads are met.
4. All housekeeping pads located in, on or attached to a building shall be seismically braced/connected to the building structure.

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H. Feeder Identification

1. Lighting, power, low voltage feeder wires and cables shall be identified at each point conduit run is broken by a cabinet, box, gutter, etc. Where terminal ends are available, identification shall be by means of a heat shrink wire marker, which provides terminal strain relief, Raychem Shrinkmark, or Brady Permasleeve markers. Identification in

other areas shall be by means of wraparound tape markers Raychem Cable Markers, or Brady Perma-Code. All markers shall include the feeder designation, size and description.

I. Tape

1. Splices, joints and connectors joining conductors shall be covered with insulation equivalent to that on conductors. Free ends of conductors connected to an energized source shall be taped. Voids in irregular connectors shall be filled with insulating compound before taping. Thermoplastic insulating tape approved by UL for use as sole insulation of splices shall be used and shall be applied according to manufacturer's printed specifications.

J. Testing

1. The Contractor shall obtain an independent NETA certified testing service that will provide all instrumentation and tests on the entire campus electrical system and all new and/or existing electrical equipment as hereinafter described and further directed by the Architect. The test shall be performed after the completion of all electrical systems. All tests shall be recorded, documented and submitted to the Architect for review. Submit three (3) copies on an official form indicating project location, test engineer, test conditions, test equipment data, ground system layout or diagram and final test results.

   a. Test for Phase to Ground/Defective Insulation Condition:
      - Open main service disconnect.
      - Isolate the system neutral from ground by removing the neutral disconnect link located in the service switchboard.
      - Close all submain disconnects.
      - Close all branch feeder circuit breakers.
      - Measure the resistance of each phase to ground. A properly calibrated “Megger” type test instrument to be used. The test voltage shall be 500 volts.
      - Record all readings after one-minute duration and document into a complete report.

   b. Isolating Grounds: In the event that low resistance grounds are found in the system, they shall be isolated and located by testing each circuit individually as outlined above. Make proper corrections to restore the resistance values to an acceptable value.

2. Method of obtaining ground resistance shall be in accordance with the latest edition of the James G. Biddle (Plymouth Meeting, Pennsylvania) manual published on this subject.

   a. Perform “fall-of-potential” tests on the main grounding electrode of system per IEEE Standard No. 81, Section 8.2.1.5 when suitable locations for test rods are not available, a low resistance dead earth or reference ground will be utilized.

   b. Perform the two-point method test per IEEE Standard No. 81, Section 8.2.1.1, to determine the ground resistance between the main grounding system and all major electrical equipment frames, system neutral, and/or

derived neutral points, ground rod and building steel, utility piping such as water and gas and panelboard grounds. Metal railings at building entrances and handicap ramps shall also be tested.

c. Acceptable testing equipment: Vibroground by Associated Research, Inc.; Megger Earth Tester by James G. Biddle Company; or equivalent by Megger.

3. Provide arc flash analysis for all new and existing switchgear on campus, whether or not shown in the Contract Documents and include arc flash hazard labels.
4. Provide a complete circuit breaker coordination study from the main circuit breaker at the main switchboard down to branch circuit breakers at the panelboards. The system shall be fully coordinated such that a fault anywhere in the system will only affect the next circuit protective device ahead of the fault.
5. All instrumentation and personnel required for testing shall be provided by the Contractor at the Contractors expense.
6. All ground fault equipment shall be tested by a certified testing laboratory and shall be set as recommended by the switchgear manufacturer so as to be coordinated with other protection devices within the electrical design. Copies of the coordination test and settings shall be sent to the Architect.
7. Take and record ampere and line voltage measurements under full load on all panels and switchboard feeders and motor circuits over 10 horsepower and/or 14 amperes. Record measurements at the equipment served and submit to the Architect for review.
8. If, in the opinion of the Architect, the voltages and regulations are not met within acceptable limits, make arrangements with the serving utility for proper electrical service and then verify that such has been provided.
9. Refer to testing (additional requirements) elsewhere in this specification for additional testing requirements.
10. The maximum resistance to ground shall not exceed 5 ohms.
11. Upon completion of work, the Contractor shall make additional tests as necessary to satisfy the Owner or the Architect or his representative that the true intent and meaning of the drawings and specifications have been carried out. Contractor shall provide all instruments and labor necessary to make such tests. Any work showing faults under test, and any work not in accordance with the specifications, shall be made good by the Contractor at his own expense. Such tests may occur at anytime during the guarantee period.

END OF SECTIOIN 26 01 00

SECTION 26 51 00 – LIGHTING FIXTURES

PART 1 – GENERAL

1.1 SECTIONS INCLUDES

A. Fixture descriptions, electrical and operating characteristics and installation requirements.

B. Lighting fixtures shall have all parts and fittings necessary to completely and properly install the fixture. All fixtures shall be completely wired with conductors meeting applicable Underwriters' Laboratories requirements. All fixtures shall be equipped with lamps of size and type specified.

C. All fixtures shall be complete with accessories, end caps, plaster frames, yokes, hangers, etc., which are required for the specific installations and physical conditions encountered in this project.

D. The catalog numbers included in the description of the various types of lighting fixtures shall be basically considered to establish the type or class of the fixture with a particular manufacturer only. The fixture length, number of lamps, component materials, accessories and all other features required to fulfill the total description of the fixture based on all drawing and specification information shall be complied with regardless of whether or not the catalog number specifically includes these features. If any conflict exists between the catalog number and the description, the Contractor shall either resolve the conflict with the Architect prior to submittal of his bid or furnish the fixture to meet the intent as later interpreted by the Architect without change in contract price.

PART 2 – PRODUCTS

2.1 PENDENT FIXTURES

A. All pendent stem mounting fixtures shall be supplied with swivel hanger and canopy assemblies providing 45 degree swiveling at top in any direction from plumb and meeting all other requirements of the Office of the State Architect and Table 23-P Part 2, Title 24, California Code of Regulations. Swivel and canopy assemblies shall also have approved hinged connection at bottom which shall be able to withstand at least 100% seismic longitudinal load without any permanent distortion or damage of metal. Hangers with the proper degree of swivel and labeled by the Los Angeles City Testing laboratory are acceptable to the Department of the State Architect.

B. All swivel and canopy assemblies shall be suitable for the type of conduit mounting (surface or concealed) or the type of ceiling construction employed.

C. For pendent fixtures, individual fixtures shall be suspended on two swivel assemblies, and continuous rows shall be suspended on one more hanger assembly than the number of fixtures.

D. Each pendent mounted lighting fixture shall be with a safety cable or wire inside of each stem securely attached to the building structure at the top and to the fixture body at the bottom. The installed safety cable or wire shall be capable of supporting at least 4 times the fixture weight and shall be so tested, and the fixture shall be able to swing the full 45 degrees with this cable or wire installed. The Inspector shall verify this test and shall so state in his report.

2.2 SURFACE MOUNTED FIXTURES

A. All surface mounted fixtures shall be suitable for mounting on low density material.

2.3 RECESSED FIXTURES

A. All fixtures mounted in plastered ceilings shall be equipped with plaster frame.

B. Recessed fixtures must have Underwriters' Laboratories labeling for through wiring.

C. Recessed fixtures shall have Underwriters' Laboratories approved thermal protection (TP).

2.4 CONTINUOUS ROW FIXTURES

A. Fixture catalog numbers called out hereinafter are for individual units. Where two or more units are combined for continuous row installation, the Contractor shall furnish and install the necessary accessories for the indicated requirements.

2.5 DIFFUSERS

A. Unless noted otherwise, all lighting fixture diffuser shall be virgin acrylic plastic.

B. All flat plastic diffusers shall be clear with male conical prisms and manufactured from clear virgin acrylic. Lens shall be as manufactured by Rohm & Haas Co., KSH or Continental Polymers. Nominal 2' x 4' or smaller lenses shall have a minimum unpenetrated depth of 0.1045" and a minimum overall thickness of 0.1875".

C. Shaped acrylic lenses shall be manufactured from Rohm & Haas Plexiglas V, V Type 920 or VM, or approved equal using injection molding or extrusion.

PART 3 – EXECUTION

3.1 GENERAL

A. Unless specifically indicated otherwise, all lighting fixtures and/or fixture stems shall be placed symmetrically with respect to the ceiling tile pattern or other architectural ceiling and wall modules.

B. All fixtures of one type shall be of one manufacture and of identical finish and appearance.

END OF SECTION 26 51 00