

Project Manual

for

Twin Rivers USD 2026 Restroom & Lounge Refreshes

Submitted January 16, 2026

Architect's Project Number **25-T02-00**



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PART 1 - GENERAL

1.1 ADDITIONAL REQUIREMENTS

- A. In addition to the duties specified in the Contract Documents, the duties of the Contractor shall be in accordance with the requirements specified in Section 4-343 of Part 1, Title 24, California Code of Regulations (CCR).
- B. In addition to the duties specified in the Contract Documents, the duties of the Architect and the Architect's consultants shall be in accordance with the requirements specified in Section 4-333(a) and 4-341 of Part 1, Title 24, CCR.
- C. DSA is not subject to arbitration proceedings.
- D. Notify DSA at start of construction in accordance with Section 4-341 of Part 1, Title 24, CCR.
- E. All addenda shall be submitted for DSA approval.
- F. All substitutions and changes affecting structural safety, accessibility, or fire and life safety shall be submitted for DSA approval in the form of an addendum or a Construction Change Document (CCD). Do not begin any work under an addendum or CCD until DSA approval is obtained. Addenda and CCD's shall be in accordance with Section 4-338 of Part 1, Title 24, CCR.
- G. Do not begin work under a written order until a CCD has been submitted to and approved by DSA in accordance with Section 4-338 or Part 1, Title 24, CCR.
- H. Unless otherwise indicated or specified, perform the work in conformance with the latest edition of applicable regulatory requirements. A copy of Part 1 and Part 2 of Title 24, CCR shall be available on the Project site. The codes adopted by the City, County, State and Federal agencies shall govern minimum requirements for this Project.
- I. Contractor shall submit verified reports in accordance with Sections 4-341 and 4-343(c) of Part 1, Title 24, CCR.
- J. During construction, reconstruction, rehabilitation, repair, alteration of, or addition to any school building, DSA, as provided by the Act, shall make such site visits as in its judgment are necessary for proper enforcement of the Act and the protection of the safety of the pupils, the teachers, and the public. If at any time as the work progresses, prior to the issuance of the certification of compliance it is found that modifications or changes are necessary to secure safety or to comply with code requirements, DSA shall notify the architect or registered engineer in general responsible charge, the contractor, and school district, of the necessity for such modifications or changes.
- K. Construction shall be observed by a full-time Project Inspector approved by DSA in accordance with Section 4-333(b) and 4-342 of Part 1, Title 24, CCR.
- L. Testing requirements of Owner's Testing Laboratory shall be in accordance with Section 4-335 of Part 1, Title 24, CCR and shall be approved by DSA.

- M. Special Inspection on masonry construction, glued laminated lumber, wood framing using timber connectors, ready-mixed concrete, gunite, prestressed concrete, high strength steel bolt installation, welding, pile driving, and mechanical and electrical work shall be as required by Section 4-333(c) of Part 1, Title 24, CCR. The costs of special inspection will be paid for by the Owner.
- N. The intent of these drawings and specifications is that the work of the alteration, rehabilitation or reconstruction is to be in accordance with Title 24, California Code of Regulations. Should any existing conditions such as deterioration or non-complying construction be discovered which is not covered by the contract documents wherein the finished work will not comply with Title 24, California Code of Regulations, a change order, or a separate set of plans and specifications, detailing and specifying the required work shall be submitted to and approved by the Office before proceeding with the work.

1.2 SITE SAFETY PLAN

- A. The Contractor shall be responsible for the development, implementation, and maintenance of an approved, written site safety plan establishing a fire prevention program at the project site applicable throughout all phases of the construction, repair, alteration, or demolition work. The plan shall address the requirements of Chapter 33 as well as any other requirements within the California Fire Code (CFC), the duties of staff, and staff training requirements. The plan shall be submitted and approved by DSA prior to DSA issuing an inspection card. Any changes to the plan must also be submitted to DSA for approval.
- B. The site safety plan shall include the following as applicable:
 - 1. Name and contact information of site safety director.
 - 2. Documentation of the training of the site safety director and fire watch personnel.
 - 3. Procedures for reporting emergencies.
 - 4. Fire department vehicle access routes.
 - 5. Location of fire protection equipment, including portable fire extinguishers, standpipes, fire department connections and fire hydrants.
 - 6. Smoking and cooking policies, designated areas to be used where approved, and signage locations in accordance with Section 3305.8.
 - 7. Location and safety considerations for temporary heating equipment.
 - 8. Hot work permit plan.
 - 9. Plans for control of combustible waste material.
 - 10. Locations and methods for storage and use of flammable and combustible liquids and other hazardous materials.
 - 11. Provisions for site security.
 - 12. Changes that affect this plan.
 - 13. Other site-specific information required by the fire code official.

C. Sample Safety Plan

Project Name:

Site Address:

Site Safety Director's Contact Information:

Name:

Phone Number:

Email Address:

- 1. What training has the Site Safety Director and fire watch personnel completed to qualify for this position? (NFPA Construction Site Fire Safety Fundamentals Online Training is an

approved training course: <https://www.nfpa.org/for-professionals/training-for-me/building-and-life-safety-training/construction-site-fire-safety-fundamentals-online-training>)

- a.
2. What are the site procedures for reporting emergencies?
 - a.
3. What are the fire department access routes for this site during construction? (attach site plan)
 - a.
4. What are the locations of fire protection equipment, including portable fire extinguishers, standpipes, fire department connections and fire hydrants? A site/floor plan may be attached.
 - a.
5. What are the smoking and cooking policies, designated areas to be used where approved, and signage locations in accordance with Section 3305.8?
 - a.
6. Will temporary heating equipment be used on site? Indicate location and safety considerations for temporary heating equipment. A site/floor plan may be attached.
 - a.
7. Will there be hot works on site? What is the hot work permit plan?
 - a.
8. What is the plan for control of combustible waste material?
 - a.
9. Indicate locations and methods for storage and use of flammable and combustible liquids and other hazardous materials. A site/floor plan may be attached.
 - a.
10. What are the provisions for site security?
 - a.
11. Are there any changes foreseen that will affect this plan?
 - a.
12. Indicate any other site-specific information that is pertinent for fire code official to be aware of.
 - a.

By signing this acknowledgement form, I am confirming that I, the project Site Safety Director, understand the application of Section 3303.1 of the current version of the CFC to this project. I also understand that I am responsible for notifying the Local Fire Authority of any changes to the above plan.

Signature

Printed Name

Date

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Work under separate contracts.
 - 4. Owner-furnished products.
 - 5. Access to site.
 - 6. Coordination with occupants.
 - 7. Work restrictions.
 - 8. Specification and drawing conventions.
 - 9. Miscellaneous provisions.

1.2 PROJECT INFORMATION

- A. Project Identification: Twin Rivers USD Restroom and Staff Lounge Refresh.
 - 1. Project Location: Various Sites.
- B. Owner: Twin Rivers Unified School District.
 - 1. Owner's Representative: Adam Dreuth.
- C. Architect: Synthesis Partners.
- D. Contractor: TBD.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
 - 1. Refer to Scope of Work on the Cover Sheet of the Project Drawings.
- B. Type of Contract:

1. All projects will be constructed under a lease-leaseback contract except for Regency Park ES which will be design-bid-build.

1.4 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Concurrent Work: Owner may award separate contract(s) for other construction operations at Project site. Those operations may be conducted simultaneously with work under this Contract.

1.5 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products.

1.6 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 1. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.7 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.

2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.8 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 6 a.m. to 5 p.m., Monday through Friday, unless otherwise agreed upon.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 1. Notify Owner not less than two days in advance of proposed disruptive operations.
 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Smoking, use of tobacco products, or other controlled substances is not permitted in the building or on site.
- F. Employee Identification: When required, Owner will provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
 1. Maintain list of approved screened personnel with Owner's representative.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
 - 3. Keynoting: Materials and products are identified using common terminology. If it is unclear which Specification Section in this Project Manual applies to any situation, immediately request clarification from the Architect.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

- A. Section Includes:
 - 1. Demolition and removal of selected elements.
 - 2. Salvage of existing items to be reused or recycled.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
 - 2. Section 017300 "Execution" for cutting and patching procedures.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse].
- C. Remove and Salvage for Reinstallation: Detach items from existing construction, clean and prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 1. Before selective demolition, Owner will remove the following items:
 - a. Printers, copiers, other IT equipment.

- b. Vending machines.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. 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 the Work.
 - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been shut off, disconnected, or capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or videos.
 - 1. Comply with requirements specified in Section 013233 "Photographic Documentation."
 - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by

salvage operations and notify the Owner and Architect immediately if any such damage is present so that a determination may be made to repair or replace the item.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary."
 - 2. Arrange to shut off indicated utilities with the Owner and utility companies.
 - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 - 4. Maintain adequate ventilation when using cutting torches.
 - 5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 6. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 7. Dispose of demolished items and materials promptly.
- B. Removed and Salvaged Items:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area designated by Owner.
 - 5. Protect items from damage during transport and storage.
- C. Removed and Reinstalled Items:
 - 1. Clean and repair items to functional condition adequate for intended reuse.
 - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

- C. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn demolished materials.

3.7 CLEANING

- A. Clean adjacent surfaces of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 033053 - MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete.
- B. Related Sections:
 - 1. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Other Action Submittal:
 - 1. Design Mixtures: For each concrete mixture.

1.3 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. Comply with the following sections of ACI 301 (ACI 301M), unless modified by requirements in the Contract Documents:
 - 1. "General Requirements."
 - 2. "Formwork and Formwork Accessories."
 - 3. "Reinforcement and Reinforcement Supports."
 - 4. "Concrete Mixtures."
 - 5. "Handling, Placing, and Constructing."
- C. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 - PRODUCTS

2.1 FORMWORK

- A. Furnish formwork and formwork accessories according to ACI 301 (ACI 301M).

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Plain-Steel Wire: ASTM A 82, as drawn.

- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, **Type I/II**
 - a. Fly Ash: ASTM C 618, Class F or C.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Normal-Weight Aggregate: ASTM C 33, graded, **1-1/2-inch** nominal maximum aggregate size.
- C. Lightweight Aggregate: ASTM C 330, **1-inch** nominal maximum aggregate size.
- D. Water: ASTM C 94.

2.4 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494, Type A.
 - 2. Retarding Admixture: ASTM C 494, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

2.5 RELATED MATERIALS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Stego Industries, LLC; Stego Wrap 15 mil Class A or approved equal.
- B. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

2.6 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth or cotton mats.

- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.

2.7 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment (used where drawings call for concrete to be the finished floor): Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ChemMasters; Chemisil Plus.
 - b. ChemTec Int'l; ChemTec One.
 - c. Conspec by Dayton Superior; Intraseal.
 - d. Curecrete Distribution Inc.; Ashford Formula.
 - e. Dayton Superior Corporation; Day-Chem Sure Hard (J-17).
 - f. Edoco by Dayton Superior; Titan Hard.
 - g. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
 - h. Kaufman Products, Inc.; SureHard.
 - i. L&M Construction Chemicals, Inc.; Seal Hard.
 - j. Meadows, W. R., Inc.; LIQUI-HARD.
 - k. Metalcrete Industries; Floorsaver.
 - l. Nox-Crete Products Group; Duro-Nox.
 - m. Symons by Dayton Superior; Buff Hard.
 - n. US SPEC, Division of US Mix Products Company; US SPEC Industraseal.
 - o. Vexcon Chemicals, Inc.; Vexcon StarSeal PS Clear.

2.8 CONCRETE MIXTURES

- A. Comply with ACI 301 requirements for concrete mixtures.
- B. Normal-Weight Concrete: Prepare design mixes, proportioned according to ACI 301, as follows:
 - 1. Minimum Compressive Strength: 3000 **psi** at 28 days.
 - 2. Slump Limit: **4 inches**, plus or minus 1 inch.
 - 3. Air Content: Maintain within range permitted by ACI 301. Do not allow air content of trowel-finished floor slabs to exceed 3 percent.

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.
 - 1. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..

3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, construct, erect, brace, and maintain formwork according to ACI 301.

3.2 VAPOR RETARDERS

- A. Install, protect, and repair vapor retarders according to ASTM E 1643; place sheets in position with longest dimension parallel with direction of pour.
 1. Lap joints 6 inches and seal with manufacturer's recommended adhesive or joint tape.

3.3 STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Locate and install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least **one-fourth** of concrete thickness, as follows:
 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 1. Extend joint fillers full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

3.5 CONCRETE PLACEMENT

- A. Comply with ACI 301 for placing concrete.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
- C. Consolidate concrete with mechanical vibrating equipment.
- D. Equipment Bases and Foundations:
 - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - 2. Construct concrete bases 4 **inches** high unless otherwise indicated; and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 - 3. Minimum Compressive Strength: **3000 psi** at 28 days.
 - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete substrate.
 - 6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.6 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding 1/2 inch.
 - 1. Apply to concrete surfaces **not exposed to public view**.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch.
 - 1. Apply to concrete surfaces **exposed to public view**.

3.7 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests: Perform according to ACI 301.
 1. Testing Frequency: One composite sample shall be obtained for each day's pour of each concrete mix exceeding 5 cu. yd. but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

3.9 REPAIRS

- A. Remove and replace concrete that does not comply with requirements in this Section.

END OF SECTION 033053

SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Plastic-laminate-faced architectural cabinets.
 - 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.
 - 2. Section 123623.13 "Plastic-Laminate-Clad Countertops."

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products, adhesives, and cabinet hardware and accessories.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
- C. Samples for Initial Selection or Verification:
 - 1. Plastic laminates.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For the following:
 - 1. Composite wood and agrifiber products.
 - 2. Thermoset decorative panels.
 - 3. High-pressure decorative laminate.
 - 4. Adhesives.
- B. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

- B. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "North American Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements as currently published at naaws.com.
- B. Grade: Custom.
- C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

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. Formica Corporation.
 - b. Wilsonart International.
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 1. As selected by Architect from laminate manufacturer's full range in the following categories:
 - a. Solid colors, matte finish.
 - b. Solid colors with core same color as surface, matte finish.
 - c. Wood grains, matte finish.
 - d. Patterns, matte finish.

2.2 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Type of Construction: Frameless.
- B. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.
- C. Reveal Dimension: 1/2 inch.
- D. Laminate Cladding for Exposed Surfaces:
 1. Horizontal Surfaces: Grade HGS.
 2. Postformed Surfaces: Grade HGP.
 3. Vertical Surfaces: Grade VGS.
 4. Edges: Grade HGS.
 5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.
- E. Materials for Semiexposed Surfaces:
 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
 - a. Edges of Plastic-Laminate Shelves: PVC T-mold matching laminate in color, pattern, and finish.
 - b. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
 - c. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.
 2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
 3. Drawer Bottoms: Hardwood plywood.
- F. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- G. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

2.3 PLASTIC-LAMINATE COUNTERTOPS

- A. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.
- B. Edge Treatment: Waterfall.
- C. Backsplash: 4" unless otherwise indicated on the drawings.
- D. Core Material: Particleboard, medium-density fiberboard, plywood, or otherwise approved engineered core.
- E. Core Thickness: 3/4 inch.
 - 1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.
- F. Colors:
 - 1. Formica Trespa Black craquele, CO-09.

2.4 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
 - 2. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.
 - 3. Softwood Plywood: DOC PS 1.
 - 4. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, containing no urea formaldehyde.
 - 5. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.5 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Butt Hinges: 2-3/4-inch, five-knuckle steel hinges made from 0.095-inch- thick metal, and as follows:
 - 1. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.
 - 2. Color: Black.
 - 3. Hafele Advantage 5 K (#354.65.300) or approved equal.
- C. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
 - 1. Color: Black.
 - 2. Provide 2 pulls for drawers more than 24" wide.

3. Jamison (#SWP4-BLK) or approved equal.
- D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- E. Fixed Shelf Supports
 1. Knappe & Vogt, KV208WH or approved equal.
- F. Shelf Rests: BHMA A156.9, B04013; metal. Provide earthquake pins or clips on at least two corners of each shelf.
 1. Peter Meier 02.7923.104 for earthquake pin supports or approved equal.
 2. Peter Meier 02.7879.104 for standard shelf supports or approved equal.
- G. Drawer Slides: BHMA A156.9.
 1. Grade 1HD-100: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
 - a. Knappe & Vogt, KV8400 or approved equal.
 2. For computer keyboard shelves, provide Grade 1.
 3. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-200.
- H. Aluminum Slides for Sliding Glass Doors: BHMA A156.9, B07063.
- I. Drawer and Hinged Door Locks: Cylindrical (cam) type, 5-pin tumbler, brass with chrome-plated finish, and complying with BHMA A156.11, Grade 1. Manufacturer; Olympus Lock 700 SC and 800 SC or approved equal.
 1. Provide a minimum of two keys per lock and six master keys.
 2. Provide locks where indicated.
- J. Door and Drawer Silencers: BHMA A156.16, L03011.
- K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 1. Flat Black Coated: BHMA 622 for brass or bronze base; BHMA 631 for steel base; BHMA 671 for aluminum base.
 2. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
 3. Satin Stainless Steel: BHMA 630.
 4. Satin Aluminum: BHMA 628.
 5. Satin Nickel: BHMA 632.
- L. Grommets for Cable Passage through Countertops: 2-inch OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.
- M. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.6 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

- C. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.7 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate cabinets to dimensions, profiles, and details indicated.
- C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
- B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork.
 - 1. Use filler matching finish of items being installed.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116

SECTION 06 64 01 - FIBER REINFORCED PLASTIC LAMINATE WALL PANELS (FRP)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Fiber Reinforced Plastic Laminate Wall Panels.
 - 2. Accessories, including trim, adhesives, and sealants.
- B. Related Sections:
 - 1. Section 09 67 23: Resinous Flooring & Base.
 - 2. Section 09 29 00: Gypsum Board.
 - 3. Section 09 90 00: Interior Painting.

1.2 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's product literature including:
 - a. Product cut sheets.
 - b. Preparation instructions and recommendations.
 - c. Storage and handling requirements and recommendations.
 - d. Installation methods.
- B. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.
- C. Samples for Verification: Submit manufacturer's standard samples representing specified selected colors and finishes, including exposed molding and trim.

1.3 QUALITY ASSURANCE

- A. Surface Burning Characteristics: US Standard UL-723/ASTM E 84 Class A.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in unopened factory packaging.
- B. Store and handle in strict compliance with manufacturer's instructions and recommendations.

1.5 WARRANTY

- A. Provide manufacturer's standard warranty.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Building are to be fully enclosed prior to installation with sufficient heat (70°) and ventilation consistent with good working conditions for finish work
- B. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.
 - 1. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

PART 2 - PRODUCTS

2.1 FIBER REINFORCED LAMINATE PANELS (FRP)

- A. Manufacturer: Panolam Industries International, Inc.
 - 1. One Corporate Drive, Suite 725, Shelton, CT 06484.
 - 2. Tel: 203-925-1556. Web: www.panolam.com.
- B. Panels shall comply with the following:
 - 1. Thickness: 0.075 inches Also available in a sanded back for door applications only (0.062 inches).
 - 2. Color and Finish: As selected by architect from manufacturer's full range of Nevamar or Pionite colors and designs.
 - 3. Surface Burning Characteristics: US Standard UL-723/ASTM E 84 Class A; Canadian Standard ULC-S102 Class A for Surface Burning Characteristics of Building Materials.
 - 4. Sustainability, Indoor Air Quality: GREENGUARD Gold Certification.
 - 5. IMO Certified for marine use.
 - 6. Chemical resistant compliant with SEFA 8 requirements.
 - 7. Wear Resistance (Cycles) NEMA 3.13: 3500 typical.
 - 8. Flexural Strength ASTM D790: 20,148 psi typical.
 - 9. Molding Profiles: Outside corners flat, outside corners round, division bars, inside corners, standard end caps.
 - 10. Adhesive: Construction Adhesive #4319 by Franklin Adhesives and Polymers or equal approved by panel manufacturer.
 - 11. Joint Caulking: Color Sil by Color Rite or equal approved by panel manufacturer; 100 percent silicone based colored caulking.
- C. Color:
 - 1. Pionite, FA389, Head Over Heels or FS826 Opti Gray, TBD.
- D. Trim:
 - 1. Extruded aluminum.
 - a. Colors:
 - 1) Satin anodized top and bottom.
 - 2) Trim between panels shall be painted to match wall panel.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install products in strict accordance with manufacturer's instructions and approved submittals.
 - 1. Clean substrate of dirt, dust, waxes, and other bond breaking substances prior to beginning installation. The wall must be finished to level 3 and fully primed.
 - 2. Install panels with bottom edge located to clear top of any rigid wall base. Rubber wall bases may be bonded over the panels using a polymer- or urethane-based adhesive.
 - 3. Apply adhesive uniformly using adhesive manufacturers recommended notched trowel to the entire back of panels completely to the edge.
 - 4. Lay panels in place leaving approximately 1/8 inch vertical installations 3/16 inch for horizontal installations between panel joints.
 - 5. Follow adhesive manufacturer's recommendations for set and application times.
 - 6. If attaching panels to a door or wood substrate, use contact glue. Follow contact glue manufacturer's directions.
 - 7. Apply pressure to entire panel face with laminate type roller to remove trapped air and ensure proper adhesion between surfaces.
 - 8. If no trim is used, seal panel joints and top, side, and bottom edges with 100% silicone caulking to match panel color. Wipe smooth and remove excess caulk from panel face.

3.3 ADJUSTING AND CLEANING

- A. Replace installations out of plumb and not aligned with adjacent panels and construction.
- B. Clean panel face to remove soiling, stains, dust, and dirt using clean rags, and cleaning agents as instructed by manufacturer.
- C. Leave installation clean, free of residue and debris resulting from work of this section.

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.

B. Related Sections:

1. Section 09 29 00 "Gypsum Board" for sealing perimeter joints.
2. Section 32 13 73 "Concrete Paving Joint Sealants" for sealing joints in pavements, walkways, and curbing.

1.2 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

B. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

1.5 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

- A. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range to closely match adjacent surfaces.

2.2 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 790.
 - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
 - c. Sika Corporation, Construction Products Division; SikaSil-C990.

- B. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

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

- a. Pecora Corporation; 898.

2.3 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

2.4 MISCELLANEOUS MATERIALS

- A. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way and formulated to promote optimum adhesion of sealants to joint substrates.

PART 3 - EXECUTION

3.1 PREINSTALLATION CONFERENCE

- A. Prior to applying joint sealants that will be visible in the finished construction, the contractor shall meet with the architect at the site to review colors of sealants to be applied in exposed locations.

3.2 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.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. 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.
2. Clean porous joint substrate surfaces by brushing, grinding, 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 after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. FRP.

3.4 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce 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 sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, 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 recommendations.

3.5 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 1 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.6 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.7 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants 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 installations with repaired areas are indistinguishable from original work.

3.8 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Perimeter joints between materials for frames of doors, windows, louvers and in-fill opening where flashing maybe required or indicated on drawings.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors to closely match existing.
- B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors to closely match existing.

- C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Perimeter joints of exterior openings where indicated.
 - b. Vertical joints on exposed surfaces of walls.
 - c. Perimeter joints between interior wall surfaces and frames of interior doors windows.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors to closely match existing.
- D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - 2. Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, Silicone.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors to closely match existing.
- E. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint-Sealant Color: As selected by Architect from manufacturer's full range to closely match existing.

END OF SECTION

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Access doors and frames for walls and ceilings.
- B. Related Requirements:
 - 1. All Mechanical Sections for access to and maintenance of mechanical equipment.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- B. Flush Access Doors with Concealed Flanges:
 - 1. Assembly Description: Fabricate door to fit flush to frame.
 - 2. Locations: As indicated on drawings.
 - 3. Door Size: As indicated on drawings.
 - 4. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gauge.
 - a. Finish: Factory prime, field paint.
 - 5. Frame Material: Same material and thickness as door.
 - 6. Hinges: Manufacturer's standard.
 - 7. Hardware: Keyed latch.

2.2 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

- D. Frame Anchors: Same type as door face.
- E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum board and gypsum base securely attached to perimeter of frames.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.
- E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 - 1. For cylinder locks, furnish two keys per lock and key all locks alike.
 - 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Steel and Metallic-Coated-Steel Finishes:
 - 1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install frames tight to adjacent finish surfaces.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Mechanical door hardware for the following:
 - a. Swinging doors.
- B. Related Sections:
 - 1. Section 064116 "Plastic-Laminate-Faced Architectural Cabinets" for cabinet door hardware provided with cabinets.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers.
- B. Source Limitations: Obtain each type of door hardware from a single manufacturer.
- C. Accessibility Requirements: For door hardware on doors in an accessible route, comply with Chapter 11B of the California Building Code.
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
- D. Comply with the following maximum opening-force requirements:
 - 1. Latches do not require more than 5 lbf (22.2 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
 - 2. All Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
 - 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
 - 4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

1.6 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled on Drawings to comply with requirements in this Section.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements.

2.2 HINGES

- A. Hinges: BHMA A156.1.

2.3 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Bored Locks: Minimum 1/2-inch (13-mm) latchbolt throw.
 - 2. Deadbolts: Minimum 1-inch (25-mm) bolt throw.
- C. Lock Backset: 2-3/4 inches (70 mm), unless otherwise indicated.
- D. Lock Trim:
 - 1. Description: Lever handle as indicated on Drawings.
- E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

- F. Bored Locks: BHMA A156.2; Grade 1; Series 4000.

2.4 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3.

2.5 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
 - 1. Manufacturer: Same manufacturer as for locking devices.
- B. Standard Lock Cylinders: BHMA A156.5; Grade 1; permanent cores that are interchangeable; face finished to match lockset.
- C. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.
- D. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.6 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
 - 1. Master Key System: Change keys and a master key operate cylinders.
 - 2. Grand Master Key System: Change keys, a master key, and a grand master key operate cylinders.
 - 3. Great-Grand Master Key System: Change keys, a master key, a grand master key, and a great-grand master key operate cylinders.
 - 4. Existing System:
 - a. Master key or grand master key locks to Owner's existing system.
 - b. Re-key Owner's existing master key system into new keying system.
 - 5. Keyed Alike: Key all cylinders to same change key.
- B. Keys: **Nickel silver**.
 - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: Information to be furnished by Owner.
 - 2. Quantity: In addition to one extra key blank for each lock, provide the following:
 - a. Cylinder Change Keys: Three.
 - b. Master Keys: Five.
 - c. Grand Master Keys: Five.
 - d. Great-Grand Master Keys: Five.

2.7 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

2.8 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16.

2.9 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

2.10 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

2.11 FABRICATION

- A. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
- B. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

2.12 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as directed by Owner.
 - 2. Furnish permanent cores to Owner for installation.
- E. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."
- F. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- G. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

- H. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
 - 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - 3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

END OF SECTION 087100

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.
 - 2. Texture finishes.
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for framing and blocking.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 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.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are 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 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type X: ASTM C 1396.
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered.
- B. Gypsum Ceiling Board: ASTM C 1396.
 - 1. Thickness: 1/2 inch.
 - 2. Long Edges: Tapered.
- C. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396. With moisture- and mold-resistant core and paper surfaces.
 - 1. Core: 5/8 inch, Type X.
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.3 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 - 2. Shapes:
 - a. Cornerbead.

2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - 3. Tile Backing Panels: As recommended by panel manufacturer.
- 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 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 setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. 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 thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

2.6 TEXTURE FINISHES

- A. Primer: As recommended by textured finish manufacturer.
- B. Non-Aggregate Finish: Pre-mixed, vinyl texture finish for spray application.
 1. Products: Subject to compliance with requirements,
 - a. CertainTeed Corp.; ProRoc Easi-Tex Spray Texture.
 - b. USG Corporation; BEADEX FasTex Wall and Ceiling Spray Texture.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- 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 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 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. 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- wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- 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. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 1. Wallboard Type: As indicated on Drawings.
 2. Type X: As indicated on Drawings.
 3. Ceiling Type: As indicated on Drawings.
 4. Moisture- and Mold-Resistant Type: As 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 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.
 3. On Z-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.

3.4 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. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners unless otherwise indicated.

3.5 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 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 4: At 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."

3.6 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.7 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 092900

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Flooring transition strips.
- B. Related Sections:
 - 1. Section 09 65 19 "Resilient Tile Flooring".

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Product Schedule: For resilient products.

1.3 MATERIALS MAINTENANCE SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 300 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

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 or more than 90 deg F.

1.6 PROJECT CONDITIONS

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

1. 48 hours before installation.
 2. During installation.
 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

- A. Resilient Base:
1. Type TS
 - a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
- B. Minimum Thickness: 0.125 inch.
- C. Height: 4 inches unless otherwise indicated on Drawings.
- D. Lengths: Coils in manufacturer's standard length.
- E. Outside Corners: Job formed.
- F. Inside Corners: Job formed.
- G. Finish: To match existing or as selected by Architect from manufacturer's full range.
- H. Colors and Patterns: Match existing or as selected by Architect from full range of industry colors.

2.2 FLOORING TRANSITION STRIPS

- A. General:
1. Manufacturer:
 - a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 2. Approved Types:
 - a. 150 Tile-Carpet Joiner
 - b. 365 Cerco Edge T
 - c. 940 Standard Edge T
 - d. 130 Carpet Reducer - 5/16"
 - e. 140 Carpet Reducer - 1/4"
 - f. 146 Universal Reducer - 3/8"
 - g. 160 Universal Reducer
 - h. 800 Imperial Reducer - 1/4"
 - i. 735 Underslung Reducer (Dry Back)

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

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.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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 and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are same temperature as the space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 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 as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.

- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, visible adhesive and surface blemishes from resilient stair treads before applying liquid floor polish.
 - 1. Apply two coat(s).
- E. Cover resilient products until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Luxury vinyl floor tile (LVT).

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: Full-size units of each color and pattern of floor tile required.
- C. Product Schedule: For floor tile.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile 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). Store floor tiles on flat surfaces.

1.7 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time 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 or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 LUXURY VINYL FLOOR TILE (LVT)

- A. Products: Subject to compliance with requirements, provide the following:
1. Johnsonite; A Tarkett Company; **<Insert product name or designation>**.
- B. Colors and Patterns: **<Insert colors and patterns>**.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions.

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

3.2 PREPARATION

- A. Prepare substrates according to floor tile 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 floor tiles until they are the same temperature as the space where they are to be installed.
 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 1. Lay tiles **[square with room axis] [at a 45-degree angle with room axis] [in pattern indicated]** <Insert requirements>.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 1. Lay tiles **[with grain running in one direction] [with grain direction alternating in adjacent tiles (basket-weave pattern)] [in pattern of colors and sizes indicated]**.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION 096519

SECTION 096723 - RESINOUS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. High-performance resinous flooring systems.

B. Related Sections:

1. Section 079200 "Joint Sealants" for sealants installed at joints in resinous flooring systems.

1.2 ACTION SUBMITTALS

- A. Product Data:** For each type of product indicated. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.

- B. Samples for Verification:** For each resinous flooring system required, 6 inches square, applied to a rigid backing by Installer for this Project.

1.3 INFORMATIONAL SUBMITTALS

- A. Installer Certificates:** Signed by manufacturer certifying that installers comply with specified requirements.

- B. Material Certificates:** For each resinous flooring component, from manufacturer.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data:** For resinous flooring to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:** Manufacturer's authorized representative who is trained and approved for installation of flooring systems required for this Project.

1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.

- B. Source Limitations:** Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with unbroken seals, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 HIGH-PERFORMANCE RESINOUS FLOORING (EPOXY FLOORING)

- A. Resinous Flooring: Abrasion-, impact- and chemical-resistant, high-performance-aggregate-filled, resin-based, monolithic floor surfacing designed to produce a seamless floor and integral cove base.
- B. Manufacturer:
 - 1. The Sherwin Williams Company, Cleveland, OH. swflooring@sherwin.com
- C. Product:
 - 1. FasTop Deco Flake SL45, 3/16" – 1/4" nominal thickness.
 - a. Cove Base: FasTop Multi Cove Base, 15-20 linear feet per kit at 6" with 1" radius.
 - b. Primer: Resuflor Aqua 3477 at 250 sq. ft. per gallon.
 - c. Slurry (1/4"): FasTop Multi SL45 32-34 sq. ft. per kit.
 - d. Broadcast: 6750/6755 Decorative Flake at 100 lbs. per 1,000 sq. ft.
 - e. Grout Coat: Resuflor 3746 at 160-200 sq. ft. per gallon.
 - f. Seal Coat: Resuflor 4686 at 250-400 sq. ft. per gallon.
 - g. Color and Pattern: Crashing Wave, 1/8" Flake, Cool Blends
 - h. Slip Resistance: Provide slip resistant finish.

2.2 ACCESSORIES

- A. Primer: Type recommended by manufacturer for substrate and body coats indicated.
- B. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.

PART 3 - EXECUTION

3.1 PREPARATION

- A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry substrate for resinous flooring application.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
 - 1. Mechanically roughen concrete substrates as follows:
 - a. Comply with ASTM C 811 requirements or manufacturer's written instructions.
 - b. Acid etching is not acceptable.
 - 2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written instructions.
 - 3. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
 - 4. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.
- C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- E. Where restroom floors exceed 2% slope to drain, level floors to meet maximum floor slope requirements.
- F. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.

3.2 APPLICATION

- A. Install resinous floor over properly prepared concrete surface in strict accordance with the manufacturer's directions.
 - 1. Install the primer and/or base coats over thoroughly cleaned and prepared concrete.
 - 2. Install topcoat over flooring after excess aggregate has been removed.
 - 3. Maintain a slab temperature of 60°F to 80°F for 24 hours minimum before applying floor topping, or as instructed by manufacturer.
- B. Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
 - 1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
 - 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.

- 3. At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.
- C. Sealant: Saw cut resinous floor topping at expansion joints in concrete slab. Fill sawcuts with sealant prior to final seal coat application. Follow manufacturer's written recommendations.
- D. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- E. Slip Resistant Finish: Provide grit for slip resistance.
- F. Apply topcoats in number indicated for flooring system and at spreading rates recommended in writing by manufacturer.

3.3 PROTECTION

- A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

END OF SECTION 096723

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on exterior substrates.
 - 1. Concrete.
 - 2. Steel.
 - 3. Galvanized metal.
 - 4. Wood.
- B. Related Requirements:
 - 1. Section 09 91 23 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

1.2 DEFINITIONS

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

1.3 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 each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location 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. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
3. VOC content.

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. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 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.
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Basis-of-Design Product: Subject to compliance with District requirements, provide product indicated (Comparable products subject to review and accepted by District prior to bid. Substitution form required):
 1. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. 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.
- C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

- D. Colors:
 - 1. Colors selected will match the existing District standard.

2.3 BLOCK FILLERS

- A. Block Filler, Latex, Interior/Exterior: MPI #4.

2.4 PRIMERS/SEALERS

- A. Primer, Alkali Resistant, Water Based: MPI #3.
- B. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

2.5 METAL PRIMERS

- A. Primer, Alkyd, Anti-Corrosive for Metal: MPI #79.
- B. Primer, Galvanized, Water Based: MPI #134.
- C. Primer, Galvanized: As recommended in writing by topcoat manufacturer.

2.6 WOOD PRIMERS

- A. Primer, Latex for Exterior Wood: MPI #6.
- B. Primer, Alkyd for Exterior Wood: MPI #5.
- C. Primer, Oil for Exterior Wood: MPI #7.

2.7 WATER-BASED PAINTS

- A. Latex, Exterior Flat (Gloss Level 1): MPI #10.
- B. Latex, Exterior Semi-Gloss (Gloss Level 5): MPI #11.
- C. Latex, Exterior, Gloss (Gloss Level 6): MPI #119.
- D. Light Industrial Coating, Exterior, Water Based (Gloss Level 3): MPI #161.
- E. Light Industrial Coating, Exterior, Water Based, Semi-Gloss (Gloss Level 5): MPI #163.
- F. Light Industrial Coating, Exterior, Water Based, Gloss (Gloss Level 6): MPI #164.

2.8 SOLVENT-BASED PAINTS

- A. Alkyd, Exterior Flat (Gloss Level 1): MPI #8.

- B. Alkyd, Exterior, Semi-Gloss (Gloss Level 5): MPI #94.
- C. Alkyd, Exterior Gloss (Gloss Level 6): MPI #9.

2.9 TEXTURED AND HIGH-BUILD COATINGS

- A. Primer for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.
- B. Intermediate Coat for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.
- C. Textured Coating, Latex, Flat: MPI #42.
- D. Primer for Latex, Exterior, High Build: As recommended in writing by topcoat manufacturer.
- E. Intermediate Coat for Latex, Exterior, High Build: As recommended in writing by topcoat manufacturer.
- F. Latex, Exterior, High Build: MPI #40.

2.10 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will 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 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. Wood: 15 percent.
 - 3. Portland Cement Plaster: 12 percent.
- C. Portland Cement Plaster Substrates: Verify that plaster is fully cured (Patch and repair).

- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. 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 and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulates.
 - 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.
- E. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
- F. 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.
- G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Paint entire exposed surface of window frames and sashes.
 - 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. 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.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 1. Paint the following work where exposed to view:
 - a. Equipment, including panelboards and switch gear.
 - b. Uninsulated metal piping.
 - c. Pipe hangers and supports.
 - d. Metal conduit.
 - e. Tanks that do not have factory-applied final finishes.
 - f. Metal cages for secondary heat-pumps located at ground level.

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 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 EXTERIOR PAINTING SCHEDULE

- A. Painting Sub-contractor and supplier shall conduct a preinstallation conference with Owner and Architect to review limits of work and the contractor shall create a detailed paint schedule to fit proposed project.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Steel.
 - 2. Gypsum board.
- B. Related Requirements:
 - 1. Section 09 29 00 "Gypsum Board"

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- 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. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
 - 3. VOC content.

1.3 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: 5 percent, but not less than 1 gal. of each material and color applied.

1.4 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.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.5 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Basis-of-Design Product: Subject to compliance with District requirements, provide product indicated (Comparable products subject to review and accepted by District prior to bid. Substitution form required):
1. Sherwin-Williams Company (The): ProMar 400 Interior
 2. Sherwin-Williams Company (The): High Build Drywall Primer
 3. Sherwin-Williams Company (The): Southwest Builders Summit Exterior Pure Acrylic Primer
 4. Sherwin-Williams Company (The): Pro-Cryl Universal Metal Primer
 5. Sherwin-Williams Company (The): SOLO Int/Ext 100% Acrylic Low VOC Semi-gloss
 6. Sherwin-Williams Company (The): W/R Alkyd In/Ext Fast Dry Primer.

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 including but not limited to; Primer/Sealers for dry wall, wood, steel and concrete, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience and MPI Index.
 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. Colors:
1. Walls: SW 7056, Reserved White.
 2. Accent Wall (one full wall per classroom):
 - a. Dental: SW color TBD.
 - b. Medical: SW 6211, Rainwashed.
 - c. Manufacturing Lab & Classroom: SW 7067, Cityscape.
 - d. Culinary: NONE.
 3. Doors: Match existing.
 4. Trim: Match existing.
- C. Sheens:
1. Walls: Eggshell.
 2. Ceiling: Eggshell.
 3. Doors: Match existing.
 4. Trim: Match existing.

2.3 PRIMERS/SEALERS

- A. Primer Sealer, Latex, Interior: MPI #50.
1. VOC Content: E Range of E2
 2. Environmental Performance Rating: EPR3.

- B. Primer Sealer, Alkyd, Interior: MPI #45.
 - 1. VOC Content: E Range of E2.
- C. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.4 METAL PRIMERS

- A. Primer, Alkyd, Quick Dry, for Metal: MPI #76.
 - 1. VOC Content: E Range E2.

2.5 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will 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 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. Wood: 15 percent.
 - 2. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- 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 and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
- E. 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.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual.". See also District standards.
 - 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. Painting Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panel boards.
 - b. Uninsulated metal piping.

- c. Pipe hangers and supports.
 - d. Metal conduit.
 - e. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - f. Other items as directed by 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 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. Painting Sub-contractor and supplier shall conduct a preinstallation conference with Owner and Architect to review limits of work and the contractor shall create a detailed paint schedule to fit proposed project.

END OF SECTION 099123

SECTION 09 93 00 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and application of wood finishes on the following substrates:

- 1. Interior Substrates:

- a. Wood doors

1.2 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- D. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- E. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 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.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.5 FIELD CONDITIONS

- A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply finishes when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

- C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: District Standard; Subject to compliance with requirements:
 - 1. Sherwin-Williams Company (The).

2.2 MATERIALS, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
 - 1. Provide materials for use within each finish 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 finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.
 - 1. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
 - 2. Shellacs, Clear: VOC not more than 730 g/L.
 - 3. Stains: VOC not more than 250 g/L.
 - 4. Primers, Sealers, and Undercoaters: 200 g/L.
- D. Stain Colors: As selected by Architect from manufacturer's full range to closely match existing unless otherwise noted.

2.3 WOOD FILLERS

- A. Wood Filler Paste: MPI #91.
 - 1. VOC Content: E Range of E2.

2.4 PRIMERS AND SEALERS

- A. Shellac: MPI #88.

2.5 STAINS

- A. Stain, Semi-Transparent, for Interior Wood: MPI #90.
 - 1. VOC Content: E Range of E1.

2.6 POLYURETHANE VARNISHES

- A. Varnish, Interior, Polyurethane, Oil-Modified, Satin (Gloss Level 4): MPI #57.

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 Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.
- C. Maximum Moisture Content of Interior Wood Substrates: 15 percent, when measured with an electronic moisture meter.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with finish application only after unsatisfactory conditions have been corrected.
 - 1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
 - 1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.
 - 1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 - 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
- D. Interior Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.

3. Sand surfaces that will be exposed to view and dust off.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 1. Use applicators and techniques suited for finish and substrate indicated.
 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
 3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

- A. Wood substrates, nontraffic surfaces, including wood trim architectural woodwork doors glued-laminated construction heavy timber.
 1. Polyurethane Varnish over Stain System:
 - a. Stain Coat: Stain, semi-transparent, for interior wood, MPI #90.
 - b. First Intermediate Coat: Polyurethane varnish matching topcoat.
 - c. Second Intermediate Coat: Polyurethane varnish matching topcoat.
 - d. Topcoat: Varnish, interior, polyurethane, oil-modified, satin (Gloss Level 4), MPI #57.

END OF SECTION

SECTION 101423 - PANEL SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Room-identification signs.

1.2 DEFINITIONS

- A. Accessible: In accordance with the California Building Code.
- B. Accessibility standard: Chapter 11B of the California Building Code

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For panel signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
 - 1. Include representative Samples of available typestyles and graphic symbols.
- D. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify locations of anchorage devices embedded in permanent construction by other installers by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in Chapter 11B of the California Building Code for signs.

2.2 SIGNS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. ASI Sign Systems, Inc.
 - 2. InPro Corporation.
 - 3. Approved alternate.
- B. Tactile Room-Identification, Tactile Exit, and Tactile Restroom Signs: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as indicated on the drawings.
 - 1. Laminated-Sheet Sign: As indicated on drawings.
 - a. Composite-Sheet Thickness: As indicated.
 - b. Color(s): As selected by Architect from manufacturer's full range. Sign body shall contrast at least 70% with the mounting surface color.
 - 2. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition: Eased.
 - b. Corner Condition in Elevation: Radiused, as indicated.
 - 3. Mounting: Surface mounted to wall with tamper resistant fasters at exterior locations and two-face tape at interior locations.

4. Text and Typeface: Accessible raised characters and Braille, typeface as selected by Architect from manufacturer's full range. Finish raised characters to contrast with background color, and finish Braille to match background color.

2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
 1. Use concealed fasteners and anchors unless indicated to be exposed.
 2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
 3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 - b. Fastener Heads: For nonstructural connections, use oval countersunk screws and bolts with tamper-resistant Allen-head slots unless otherwise indicated.
 4. Sign Mounting Fasteners:
 - a. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.
- B. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.

2.4 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 5. Internally brace signs for stability and for securing fasteners.
 6. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
- B. Surface-Engraved Graphics: Machine engrave characters and other graphic devices into panel surface indicated to produce precisely formed copy, incised to uniform depth.
 1. Engraved Opaque Acrylic Sheet: Fill engraved graphics with manufacturer's standard enamel.
 2. Face-Engraved Clear Acrylic Sheet: Fill engraved copy with manufacturer's standard enamel. Apply manufacturer's standard opaque background color coating to back face of acrylic sheet.

- C. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.
- D. Subsurface-Engraved Graphics: Reverse engrave back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.
- E. Shop- and Subsurface-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.

2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that anchor inserts are correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Room-Identification Signs and Other Accessible Signage: Install in locations as indicated and according to accessibility standard.
- C. Mounting Methods:

1. Through Fasteners: For all exterior room signs, drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
 2. Two-Face Tape: For all interior room and tactile exit signs, clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
 3. method specified above.
- D. Field-Applied, Vinyl-Character Signs: Clean and dry substrate. Align sign characters in final position before removing release liner. Remove release liner in stages and apply and firmly press characters into final position. Press from the middle outward to obtain good bond without blisters or fishmouths. Remove carrier film without disturbing applied vinyl film.
- E. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101423

SECTION 102113 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Solid-polymer toilet compartments configured as toilet enclosures and urinal screens.
- B. Related Sections:
 - 1. Section 061000 "Rough Carpentry" for blocking.
 - 2. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show locations of centerlines of toilet fixtures.
 - 2. Show overhead support or bracing locations.
- C. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment, from manufacturer.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.
- B. Regulatory Requirements: Comply with applicable provisions in Chapter 11B of the California Building Code for toilet compartments designated as accessible.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

1.7 WARRANTY

- A. Provide manufacturer's standard warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: ASTM B 221.
- C. Steel Sheet: Commercial steel sheet for exposed applications; mill phosphatized and selected for smoothness.
 - 1. Electrolytically Zinc Coated: ASTM A 879/A 879M, 01Z.
 - 2. Hot-Dip Galvanized: ASTM A 653/A 653M, either hot-dip galvanized or galvanized.
- D. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- E. Stainless-Steel Castings: ASTM A 743/A 743M.
- F. Zamac: ASTM B 86, commercial zinc-alloy die castings.
- G. Adhesives: Manufacturer's standard product that complies 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."

2.2 SOLID-POLYMER UNITS

- 1. Bobrick Sierra Series 1090
 - a. Toilet Compartments: 1092G.67P, Gap free doors & styles with continuous stainless steel hardware
 - b. Urinal Screens: 1093G.67P, Gap free with continuous stainless steel hardware.
- B. Toilet-Enclosure Style: Overhead braced, floor anchored.
- C. Urinal-Screen Style: Wall hung, flat panel, post to ceiling.
- D. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, seamless, with eased edges and with homogenous color and pattern throughout thickness of material.
 - 1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
 - 2. Color and Pattern: Desert Beige SC02.
- E. Pilaster Shoes: Manufacturer's standard design; stainless steel.

- F. Brackets (Fittings):
 - 1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
- A. Overhead Cross Bracing: As recommended by manufacturer and fabricated from aluminum.

2.3 ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
 - 1. Material: Stainless steel.
 - 2. Hinges: Manufacturer's standard continuous, cam type that swings to a closed position at accessible stalls and to a partially open position at other stalls.
 - 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 - 4. Coat Hook: Manufacturer's standard coat hook, sized to prevent in-swinging door from hitting.
 - 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
 - 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

2.4 FABRICATION

- A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- B. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at tops and bottoms of posts. Provide shoes at posts to conceal anchorage.
- C. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide, in-swinging doors for standard toilet compartments and out-swinging doors which provide a minimum 32-inch-wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113

SECTION 102800 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Public-use washroom accessories.
 - 2. Warm-air dryers.
 - 3. Underlavatory guards.
- B. Owner-Furnished Material:
 - 1. Paper Towel Dispensers
 - 2. Soap Dispensers
 - 3. Toilet Paper Dispensers

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.

1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 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.

1.7 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

- A. Toilet Tissue Dispenser, Paper Towel Dispenser, & Soap Dispenser:
 - 1. Owner Provided.
- B. Grab Bar:
 - 1. Product: Bobrick B-3806 x 36 & B-3806 x 48.
- C. Sanitary-Napkin Vendor:
 - 1. Product: Bockrick B-47069C.
 - 2. Type: Sanitary napkin and tampon.
 - 3. Mounting: Surface mounted.
 - 4. Operation: No coin (free).
- D. Sanitary-Napkin Disposal Unit:
 - 1. Product: Bobrick B-254.
- E. Seat-Cover Dispenser:
 - 1. Product: Bobrick B-221.
- F. Mirror Unit:
 - 1. Product: Bobrick B-165 2436.

2.2 WARM-AIR DRYERS

- A. Warm-Air Dryer:

1. Product: Excel Dryer, Inc. Xlerator XS-SB.
2. Mounting: Surface mounted.
3. Operation: Sensor activated.

2.3 UNDERLAVATORY GUARDS

A. Underlavatory Guard:

1. Product: Truebro Lav Guard 2.
2. Model: As determined by pipe configuration.
3. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
4. Material and Finish: Antimicrobial, molded plastic, white.

2.4 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 minimum of [six] <Insert number> keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. 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.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

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 recommendations.

END OF SECTION 102800

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Motor-operated roller shades.
- B. Related Requirements:
 - 1. Section 061053 "Miscellaneous Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.
 - 2. Section 079200 "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
- B. Samples for Verification:
 - 1. Shadeband Material: Not less than 3 inches square. Mark inside face of material if applicable.
 - 2. Installation Accessories: For each type of product requiring color selection.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of shadeband material, signed by product manufacturer.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roller shades to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide roller shades for each scheduled window opening.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. MechoShade Systems, Inc.
- B. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.3 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.4 ROLLER-SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible except as follows:
 - 1. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by

railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 ROLLER-SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
 - 1. Opaque Shadebands: Located so shadeband is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.
- B. Electrical Connections: Connect motor-operated roller shades to building electrical system.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

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

END OF SECTION 122413

SECTION 123623.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes plastic-laminate countertops.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product, including wood products, high-pressure decorative laminate, adhesives, and trim/banding.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show locations and sizes of cutouts and holes for plumbing fixtures.
- C. Samples for Initial Selection:
 - 1. Plastic laminates.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installer & fabricator.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver countertops until painting and similar operations that could damage countertops have been completed in installation areas. If countertops must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.6 FIELD CONDITIONS

- A. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the "North American Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.
- B. Grade: Custom.
- C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.
- D. Edge Treatment: Waterfall.
- E. Backsplash: 4" unless otherwise indicated on the drawings.
- F. Core Material: American Laminates, Am Lam M2 particleboard.
- G. Core Thickness: 3/4 inch.
 - 1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
 - 2. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.
 - 3. Softwood Plywood: DOC PS 1.

2.3 ACCESSORIES

- A. Grommets for Cable Passage through Countertops:
 - 1. Product: TG Flip-Top Series by Doug Mockett & Company, Inc.
 - 2. Color: Black.

2.4 MISCELLANEOUS MATERIALS

- A. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.5 FABRICATION

- A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:
 - 1. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
- B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.
- B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Grade: Install countertops to comply with same grade as item to be installed.
- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
 - 1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
- C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
 - 1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- D. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- E. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- F. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

2. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean countertops on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 123623.13

SECTION 22 00 00 - PLUMBING GENERAL CONDITIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies the Division 22 Work coordination requirements with general work provisions.
- B. For convenience and reference the Division 22 Specifications are separated into Divisions and Sections. Such separations shall not operate to make the Engineer an arbitrator to establish subcontract limits between the Prime Contractor and his Subcontractors. In any case, the Prime Contractor is responsible to the owner for a complete job.
- C. This section consists of General Requirements and Standard Specifications covering certain parts of work under Division 22 and is supplemented by other Division 22 sections covering additional work, requirements, and materials specifically applicable to the work of each section.
 - 1. Requirements of subsequent sections of the specifications, if in conflict with these General Requirements, shall govern.
- D. No material installed as part of this WORK shall contain asbestos in any form.

1.2 CONDITIONS OF THE CONTRACT

- A. The Conditions of the Contract (General, Supplementary, and other Conditions) and the General Requirements (Sections of Division 1) are hereby made a part of this Section.
- B. This section is a Division-22 Basic Materials and Methods section and is a part of each Division -22 section.

1.3 DESCRIPTION OF REQUIREMENTS

- A. Provide finished work, tested and ready for operation including apparatus, appliances, materials, and work. Provide incidental accessories necessary to make the work complete and ready for operation without additional expense to the Owner.
- B. Before beginning work or ordering materials, consult Architect for clarification of discrepancies between, or questionable intent, of the Contract Documents.
- C. Contractor shall visit the site and field survey the existing site conditions prior to bid. Any site conditions which may cause significant deviation from the design drawings shall be brought to the attention of the Owner's representative for clarification prior to bid.

1.4 REQUIREMENTS OF REGULATORY AGENCIES:

- A. Provide work and materials in full accordance with the latest rules and regulations of the following:
 - 1. California Code of Regulations - Title 24 - Parts 2, 3, 4,5, and 9

2. California Code of Regulations - Title 22 - Chapter 7
3. California Building Code, 2019
4. California Mechanical Code, 2019
5. California Plumbing Code, 2019
6. California Electric Code, 2019
7. California Fire Code, 2019
8. California Building Energy Efficiency Standards 2019
9. California Green Building Standards 2019
10. California Energy Code 2019
11. National Fire Protection Association
12. CAL-OSHA
13. Occupational Safety and Health Administration
14. State Fire Marshal, Title 19 CCR
15. Other applicable state laws

- B. Nothing in Drawings or specifications shall be construed to permit work not conforming to these codes.
- C. Conform to State of California Energy Conservation Standards for all systems, equipment, and construction.
- D. The above Codes and Standards define minimum requirements required for the project. Where Contract Documents differ from governing codes, furnish and install higher standard.

1.5 FEES, PERMITS, AND UTILITY SERVICES:

- A. Arrange for required inspections and permits required in installation of the work.
- B. The Owner will pay charges for permits required.
- C. Arrange for utility connections and pay charges incurred, including excess service charges, if any.

1.6 UTILITY CONNECTIONS:

- A. Prior to start of Construction and within 30 days of award of Contract, contact local gas company representative and coordinate location of gas meter and piping. In addition, coordinate time required for installation in order to avoid delay to the project.
- B. Arrange for utility connection and coordinate work with utility company.
- C. Contractor to bear the cost of all construction related to utility services from the point of connection shown on the Contract Documents. This includes any piping, excavation, backfill, boring, etc.

1.7 SITE EXAMINATION:

- A. Examine site, verify dimensions and locations against Drawings, and inform self of conditions under which work is to be done before submitting proposal. No allowance will be made for extra expense on account of error.

- B. Information shown relative to existing services is based upon available records and data but is approximate only. Make minor deviations found necessary to conform with actual locations and conditions without extra cost. Verify location and elevation of utilities prior to commencement of excavation for new piping or its installation.
- C. Exercise care in excavating near existing utilities to avoid any damage thereto. This Contractor is responsible for any damage caused by his operations.

1.8 ACTION SUBMITTALS / MATERIAL LIST AND SUBSTITUTIONS:

- A. Prior to commencement of work, and within 35 days after award of Contract, submit to Architect for review electronic copies of a complete list of equipment and materials to be furnished, including all substitutions. All submittals to be in electronic format as follows:
 - 1. Submittals to be in PDF Format.
 - 2. Individual PDF cut sheets shall be inserted into a single file for review.
 - 3. All sheets to be "unprotected" and "writable".
- B. Provide submittal information for all materials proposed for use as part of this project. Provide standard items on specified equipment at no extra cost to the contract regardless of disposition of submittal data. Other material or methods shall not be used unless approved in writing by the Architect. The Architect's review will be required even though "or equal" or synonymous terms are used.
- C. It is the responsibility of the Contractor to assume all costs incurred because of additional work and/or changes required to incorporate the proposed substitute into the project including possible extra compensation due to the Architect. Refer to Division 1 for complete instructions.
- D. Contractor to provide complete Submittal packages for all plumbing items clearly separated by system. At a maximum, submittals to be broken into the following packages:
 - 1. Plumbing – Fixtures and accessories, Trim, Piping, Equipment, Accessories, etc.
 - 2. Plumbing – Piping, Valves, Equipment, Accessories, etc.
 - a. When required by schedule, a separate Plumbing Underground submittal package will be reviewed upon request.
 - 3. Incomplete submittals or submittals broken down by spec section shall be returned un-reviewed.
- E. Identify each item by manufacturer, brand, trade name, model number, size, rating, or whatever other data is necessary to properly identify and review materials and equipment.
 - 1. Where submittal sheets indicate more than one product, Contractor to clearly identify product being submitted. Contractor to cross-out information not being submitted for review.
 - 2. Submittals that do not clearly identify submitted item will be returned to the Contractor un-reviewed.
- F. Identify each submitted item by reference to specification section number and paragraph in which item is specified. Cross reference submittals by equipment ID where applicable.
- G. Quantities are the Contractor's responsibility and will not be reviewed.
- H. If Contractor desires to make a substitution, he shall submit complete information or catalog data to show equality of equipment or material offered to that specified.
 - 1. Only one request for substitution will be considered on each item of material or equipment. No substitutions will be considered thereafter.

2. Scheduled Products and first named manufacturer/product forms basis of design. All other manufacturers' products are substitutions.
 3. No substitutions will be allowed unless requested and reviewed in writing.
 4. The Architect shall review and take appropriate action on shop Drawings, product data, samples, and other submittals required by the Contract Documents. Such review shall be only for general conformance with the design concept and general compliance with the information given in the Contract Documents. It shall not include review of quantities, dimensions, weights or gauges, fabrication processes, construction methods, coordination with the work of other trades, or construction safety precautions, all of which are the sole responsibility of the Contractor.
 5. Review of a specific item shall not indicate acceptance of an assembly of which the item is a component. The Architect shall not be required to review and shall not be responsible for any deviations from the Contract Documents not clearly noted by the Contractor, nor shall the Architect be required to review partial submissions or those for which submissions for correlated items have not been received. Architect reserves right to require originally specified item.
 6. Named non-basis-of-design manufacturer does not guarantee approval of equipment submittals. Manufacturers must comply with all the performance and features as specified within the specifications and as indicated on the design documents.
- I. Installation of reviewed substitution is Contractor's responsibility. Any changes required for installation of reviewed substituted equipment must be made without additional cost to the owner. Review by the Architect of the substituted equipment and/or dimensional Drawings do not waive these requirements.

1.9 CLOSEOUT SUBMITTALS / MAINTENANCE AND OPERATING INSTRUCTIONS:

- A. Instruct the Owners' authorized representatives in the operation, adjustment, and maintenance of all mechanical equipment and systems. Provide 3 copies of certificate signed by Owner's representatives attesting to their having been instructed.
- B. Furnish Architect with three complete sets of operating and maintenance (O&M) instructions.
1. O&M manuals to be bound in hardboard binder and indexed.
 2. O&M manuals to include: descriptive literature, catalog cuts, and diagrams covering all items of operation and maintenance for each and every mechanical system and piece of equipment furnished under these specifications.
 3. Include in each set a copy of the air balance test report specified hereinafter.
- C. Contractor must start compiling the above data (including obtaining operating and maintenance instruction data and catalog cuts and diagrams from the manufacturer of the reviewed equipment) immediately upon review of his list of materials, so as not to delay the final installation of the work.
- D. Bind and index each set in a durable, hardboard binder. Final observation will not be made until booklets are submitted and have been reviewed by the Architect.
- E. O&M manuals to incorporate the following:
1. Complete operating instructions for each item of plumbing equipment.
 2. Test data and system balancing reports as specified.
 3. Manufacturer's bulletins with parts numbers, instructions, etc. for each item of equipment. Remove information not applicable to project.
 4. Typewritten maintenance instructions for each item of equipment listing in detail the lubricants to be used, frequency of lubrications, inspections required, adjustment, etc.

5. A complete list and/or schedule of all major valves giving the valve ID, location of valve, and the rooms or area controlled by the valve.
6. Provide copies of start-up reports for each piece of equipment provided as part of this work.
7. Name, address, and phone number of contractors involved in work under this Division.
8. Detailed step-by-step instructions for starting, summer operation, winter operation, and shutdown of each system.
9. Detailed maintenance instructions for starting, summer operation, winter operation, and shutdown of each system.
10. Spare parts list.
11. Full size Record as built shop drawings in hard copies and in AutoCAD 2018 CAD files.
 - a. Contractor to incorporate field mark-ups into record drawings. Mark-up shop drawings not acceptable.

1.10 COORDINATION SHOP DRAWINGS

- A. General:
 1. Prepare and submit for review coordination drawings where work by separate entities requires fabrication of products and materials which must accurately interface or for which space provided is limited.
 2. Coordination drawings shall indicate how the work will interface and installation will be sequenced. It is the intent of this provision to find, bring forth, and resolve potential constructability problems prior to actual construction, thereby allowing for the resolution of issues before construction cost and schedule are impacted.
- B. The General Contractor shall oversee preparation of coordination drawings, assign priority space, and bring to the attention of the Architect any conflicts or interferences of an unresolved nature found during preparation of coordination drawings. Expedite conflict or interferences and submit solutions/ recommendations for approval review.
- C. Drawings: Shop drawings shall include but are not necessarily limited to the following:
 1. Submit 1/4" = 1'-0" minimum scale, a combined, comprehensive plumbing coordination drawing. Coordination drawing shall include all plumbing piping, HVAC ductwork, mechanical piping, sprinkler systems, and ceiling systems overlaid on structural frame and architectural plan. Shop drawings are to be coordinated with all electrical and Telecom systems.
 2. Criteria: Plumbing Piping, Ductwork, mechanical piping, and sprinkler system components shall be sized as shown on Drawings. Seismic restraints shall be shown where required.
 - a. Nonconforming Mechanical work installed within designated coordination areas is subject to removal and replacement by the installing contractor at no additional cost to Owner.
 3. Provide sections for congested areas.
 4. Identify typical areas, start preparation of coordination drawings for such areas first.
- D. Coordination drawings shall be signed and dated by individual trade contractors. By act of signature and submittal of singular combined coordination drawing, each trade contractor acknowledges their coordinated portion of the work with all other mechanical, electrical, telecom, architectural, and structural work contractors.
- E. After completion of coordination shop drawings signed by individual trade contractors. Submit copies to the architect for review. Once approved, provide copy at the job site for reference. No work shall be performed without the complete coordination shop drawings.

- F. No request for information regarding the routing of pipes and placement of equipment will be reviewed and responded to without a completed shop drawings.

1.11 SITE CONDITIONS

- A. Information of the drawings relative to existing conditions is approximate only. Deviations found necessary during progress of construction to conform to actual conditions as approved by the Architect shall be made without additional cost to the Owner. The Contractor shall be held responsible for any damage caused to existing services. Promptly notify the Architect if services are found which are not shown on the Drawings.

1.12 WARRANTY

- A. Be responsible for work done and material installed under these plans and specifications. Repair or replace, as may be necessary, any defective work, material, or part which may show damage to itself or other materials, furnishing, equipment, or premises caused by such defects during this period, if in the opinion of the Architect said defect is due to imperfection of material or workmanship. Provide all such work and materials at no cost to Owner.
- B. Be responsible for damage to any part of premises during guarantee period caused by leaks or breaks in work furnished and/or installed under this section. Replace refrigerant, lubricants, or gasses lost as result of defects, breaks, or leaks in work.
- C. Provide manufacturer's written warranties covering defects in material and workmanship of products and equipment utilized for the project.
- D. Warranties shall be for a period of 2 years from the date of substantial completion unless more stringently specified within individual Sections of this Division.

PART 2 - PRODUCTS

2.1 GENERAL:

- A. Mention herein or on Drawings requires that this Contractor provide each item listed of quality noted or equal. Refer to subsequence division 22 specification sections for specific equipment and system materials and accessories.
- B. All material shall be new, full weight, standard in all respects, and in first- class condition.
- C. Provide materials of the same brand or manufacture throughout for each class of material or equipment wherever possible.
- D. The grade or quality of materials desired is indicated by the trade names or catalog numbers stated herein.
- E. Dimensions, sizes, and capacities shown are a minimum and shall not be changed without permission of the Architect.
- F. Conform to the State Energy Conservation Standards for all material and equipment.

2.2 MATERIALS FURNISHED:

- A. Identify all materials and equipment by manufacturer's name and model number. Remove unidentified materials and equipment from site.
- B. Equipment specified by manufacturer's number shall include all accessories, controls, etc. listed in catalog as standard with equipment. Furnish optional or additional accessories as specified.
- C. Equipment or material damaged during transportation, installation, or operation is considered as totally damaged. Replace with new equipment. Variance from this permitted only with written consent of the Architect.
- D. Deliver, Protection, and Care:
 - 1. Deliver materials or equipment to the Project in the manufacturer's original, unopened, labeled containers.
 - 2. Added costs associated with reordering, expediting orders, or project delays due to rejected materials shall be borne by the Contractor.
 - 3. Protect from damage which may be caused by theft, weather, and building operations. Failure to protect materials and apparatus adequately shall be sufficient cause for rejection of any damaged material or equipment.
 - 4. Close pipe and equipment openings to prevent intrusion of obstructions and damage.
 - 5. Owner or Architect will require removal and replacement of such material or work from the premises which is not in accordance with Contract Documents. Replace unsatisfactory work without delay, at no additional cost to the Owner.
 - 6. All material and equipment shall be protected against moisture, dirt and damage. Protective coverings shall be provided for bearings, open connections to pumps and tanks, coils, ducts, pipes and similar equipment that is vulnerable to grit and dirt.
 - 7. The interior of the pipes shall be kept clean at all times.

PART 3 - EXECUTION

3.1 GENERAL:

- A. General arrangement and location of piping, equipment, etc. are shown on Drawings or herein specified. Carefully examine other work that may conflict with this work. Install this work in harmony with other crafts and at proper time to avoid delay of work. Provide all offsets as required to avoid other trades at no additional cost to the owner.
- B. In advance of construction, work out minor changes and relocations to suit actual conditions and work of other trades to avoid conflict therewith. This shall not be cause for additional cost.
- C. Execute any work or apparatus shown on the Drawings and not mentioned in the specifications, or vice versa, the same as if specifically mentioned by both. Omission from Drawings or specifications of any minor details of construction, installation, materials, or essential specialties does not relieve this Contractor from furnishing same in place complete.
- D. Furnish and install any incidental work not shown or specified which can reasonably be inferred as part of the work and necessary to provide a complete and workable system.
 - 1. Minor piping associated with instrumentation and control is generally not shown. Interconnection of sensors, transducers, control devices, instrumentation panels, is the responsibility of the contractor. Small piping associated with water cooling, drips, drains and other minor piping may not be shown to avoid confusion in the plan presentation

but shall be provided as part of contract work. Drains shall be piped to the nearest floor drains.

- E. Furnish materials and work at proper time to avoid delay of the work.
- F. Coordinate with testing and balancing contractor to review drawings for proposed additional balancing components required for proper system testing and balancing.

3.2 ACCESS:

- A. Continuously check Architectural Drawings for clearance and accessibility of equipment specified herein to be placed. No allowance of any kind will be made for negligence on part of Contractor to foresee means of installing his equipment into proper position.

3.3 CLOSING IN OF UNINSPECTED WORK:

- A. Do not allow or cause work installed to be covered up or enclosed before it has been inspected and tested. Should work be enclosed or covered up before it has been inspected and tested, uncover work at own expense. After it has been inspected and tested, make repairs necessary to restore work of other contractors to condition in which it was found at time of cutting.

3.4 PROJECT MODIFICATIONS:

- A. During the progress of construction, if such conditions arise that require revisions, modifications, or relocations to any mechanical equipment or materials incorporated in this project, such alterations shall be immediately called to the attention of the Architect. Contractor shall then prepare necessary Drawings showing proposed changes. Submit proposed changes for review by the Architect prior to actual revision work in the field.
- B. Two sets of Drawings showing all revisions shall be immediately presented to Architect for his records. Maintain additional copies on the project as necessary to comply with "RECORD DRAWINGS" requirement of the General Requirements.
- C. Incorporate all revisions into record Drawings.

3.5 FORMING, CUTTING AND PATCHING:

- A. Coordinate with other contractors as necessary to provide any special forming, recesses, chases, etc., and provide wood blocking, backing, and grounds as necessary for proper installation of mechanical work.
- B. If this Contractor fails to coordinate with other contractors at proper time or fails to locate items properly, resulting in extra work, then this Contractor is responsible.
- C. This Contractor is responsible for proper placement of pipe sleeves, hangers, inserts, and supports for work.
- D. Cutting, patching, and repairing of existing (old) construction to permit installation of piping, etc. is responsibility of this Contractor. Repair or replace damage to existing work with skilled mechanics for each trade involved in first-class manner.
- E. Cut existing construction in a neat and workmanlike manner by the use of a concrete saw. Use of pneumatic devices will not be allowed.

- F. Core openings through existing construction as required for the passage of new piping and conduits. Cut holes of the minimum diameter to suit size of pipe installed and associated insulation.

3.6 DEMOLITION AND SALVAGE:

- A. Provide demolition of mechanical work under this SECTION as indicated on Drawings.
- B. Removed materials which will not be re-used and which are not claimed by the owner shall become the property of the Contractor and shall be removed from the premises. Consult Owner before removing any material from the premises. Carefully remove materials claimed by the owner to prevent damage. Coordinated delivery of such items to owner.
- C. Removed materials which are to be reused are to be removed, cleaned, and stored in a safe location. If such items are lost or damaged by the Contractor, item shall be replaced with new item at no added cost to owner. If item is found to be damaged prior to removal, inform Architect prior to removal so that item may be examined by Architect and owner for further instructions.

3.7 WELDING FOR MECHANICAL WORK

- A. All mechanical welding and inspection requirement shall be in accordance with the California Mechanical Code.
- B. Qualify welding procedures, welders and operators shall be in accordance with ASME Boiler and Pressure Vessel Code, Section IX, welding and brazing qualifications. Welding procedures and testing shall comply with ANSI standard B31.9 - Standard Code for Pressure Piping, and the American Welding Society (AWS) welding handbook.
- C. Soldering and brazing procedures shall conform to ANSI B9.1 standard safety code and NFPA 99.
- D. All welders shall be certified by a state approved welding bureau. Fabricator shall have current and valid certificated registration by the building official for the types of welds required by the project. Prior to start of the project, the fabricator shall submit a copy of certificate of registration for approval. Prior to project close out, the fabricator shall submit a certificate of compliance that the work was performed in accordance with the approved plans and specifications to the building official and to the Engineer or Architect of record.

3.8 ASBESTOS ABATEMENT:

- A. Existing systems within the area of this scope of work may have asbestos-bearing materials. Testing, encapsulation, removal, treatment, or correction of existing asbestos-bearing materials is not a part of this scope of work and is not the responsibility of the mechanical contractors.

3.9 STRUCTURAL DESIGN OF EQUIPMENT AND SEISMIC RESTRAINTS:

- A. All mechanical equipment supports shall be designed by a licensed Structural Engineer and shall comply with the 2019 California Building Code, Section 1616A.1.18 through 1616A.1.26 and ASCE 7-16. Chapters 13, 26, and 30.
- B. Provide seismic sway bracing for all suspended piping and ductwork in accordance with the OSHPD anchorage pre-approval OPM-0043-13 the "Mason West Inc. Seismic Restraint Guidelines for Suspended Piping, Ductwork, and Electrical Systems".

3.10 START-UP PROVISIONS FOR MECHANICAL WORK

- A. General: Major equipment start-up shall be performed by the equipment manufacturer or authorized representative.
- B. Adjusting and Aligning Equipment: Adjust all equipment. Check all motors for proper rotation.
- C. Lubrication:
 - 1. Extend grease fittings on bearings to points of ready and easy accessibility.
 - 2. Lubricate fan bearings, etc., before operation of any equipment.
 - 3. Provide a final lubrication to equipment immediately before turning over to Owner.
- D. Provide training and orientation of Owners operating staff in proper care and operation of equipment, systems and controls.
- E. During test period, make final adjustments and balancing of equipment, systems, controls, and circuits so that all are placed in first-class operating condition.
- F. Mark final positions of balancing valves after balancing is complete.
- G. Final observation will not be made until all of the above have been completed and a preliminary copy of the balance report has been submitted and reviewed.

3.11 PLUMBING RECORD AS-BUILT DRAWINGS:

- A. During the course of Project Construction, Mechanical Contractor shall maintain recorded "As-built" information by distinctively marking up approved shop drawings prints to depict all actual work installed on a daily basis form but not limited to field conditions, addendums, architectural supplemental instructions (ASIs), instruction bulletins (IBs), change orders (COs), responses to Request For Information (RFIs), and approved product substitutions.
- B. The marked-up shop drawings will be made available at the Construction Site to the Architect upon request, at any time.
- C. The marked-up shop drawings with the recorded information shall then be used to create Record As-built drawings at the completion of the project. Contractor shall submit the Record As-built drawings in full-size hard copies and also in PDF format.
 - 1. Provide 2 complete sets of full-size drawings on 20 pound white bond paper.
 - 2. Provide 1 CD (compact disc) or Thumb Drive with Record drawings in PDF format. Files to be names the same as sheets.
 - 3. Record as-built drawings are to be full size drawings (same size as Contract Documents) and all plans are to be to standard engineering scale. The minimum drawing scale to match those provided within the Contract Documents.
- D. Record As-built drawings shall include the followings:
 - 1. Work on Record As-built drawings shall be provided with horizontal and vertical dimensions. Underground work shall be provided with invert elevations. All dimensions shall be references to permanent building fixed points and/or column lines.
 - 2. Provide sufficient details and sections to depict actual installations.
 - 3. Equipment identifications and system labeling nomenclatures shall match the Project Design Documents.
 - 4. Identification of main shut-off valves shall be based on the approved valve tag list and as actually installed in field.

5. Piping mains and branches, size and location with pipe elevation information and invert elevations for underground piping. All risers shall be clearly identified.
6. Location of plumbing fixtures, including but not limited to clean outs, floor drains, floor sinks, storm drains, catch basins, valve boxes and equipment connections.
7. Locations of all manual and automatic valves, pipe strainers, backflow preventers, water hammer arrestors, expansion joints and compensators, pipe guides and anchor points.
8. Equipment locations with dimensions from prominent building lines and requires service access.
9. Seismic bracing information for plumbing system, piping, and equipment

3.12 CLEANING UP:

- A. Remove tools, scaffolding, surplus materials, barricades, temporary walks, debris, and rubbish from the Project promptly upon completion of the work of each Section. Leave the area of operations completely clean and free of these items.

END OF SECTION

SECTION 22 05 00 - COMMON WORK FOR PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes general mechanical materials and methods required within the project. Items included within this specification section include:
 - 1. Piping Supports
 - 2. Access Doors
 - 3. Valve Boxes
 - 4. Roof Flashing
 - 5. Dielectric Unions
 - 6. Thermometers
 - 7. Gauges
 - 8. Pipe and Equipment Identification
 - 9. Fireproofing
 - 10. Painting
 - 11. Concrete
 - 12. Excavating And Backfill
 - 13. Electrical Work
 - 14. Commissioning and preliminary operational tests

1.2 ACTION SUBMITTALS

- A. Product data: submit complete data of materials proposed including:
 - 1. Manufacturer and model number
 - 2. Clearly indicate all options, trim, and accessories.
 - 3. Cross reference manufacturer's cut sheet to fixture callout ID on submittal sheet.

1.3 CLOEOUT SUBMITTALS

- A. Warranty: Submit executed warranty.
- B. Certification: Submit Contractors Certification
- C. Operation and Maintenance Data: submit complete O&M data including:
 - 1. Maintenance data and parts lists for each component.
 - 2. Provide "trouble- shooting" maintenance guide
 - 3. Include this data within maintenance manual
- D. Operation and Maintenance Data: where applicable, submit complete O&M data including:
 - 1. Maintenance data and parts lists for each component.
 - 2. Provide "trouble- shooting" maintenance guide
 - 3. Include this data within maintenance manual

1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of plumbing piping systems products, of types, materials, and sizes required whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Contractor's Qualifications: Firm with at least 5 years of successful installation experience on projects with piping systems work similar to that required of project.

1.5 WARRENTY

- A. Manufacturer: In addition to the Contractor's Standard Guarantee, furnish Owner with manufacturer's warranty for all plumbing valves and accessories against defects in materials and workmanship. Warranty shall cover replacement of product plus labor to install.

PART 2 - PRODUCTS

2.1 PIPING SUPPORTS:

- A. All mechanical equipment supports shall be designed by a licensed Structural Engineer and shall comply with the 2019 California Building Code, Section 1616A.1.18 through 1616A.1.26 and ASCE 7-16, chapters 13, 16, and 30.
- B. Mechanical equipment supports shall be designed by a licensed Structural Engineer.
- C. Provide seismic sway bracing for all suspended piping and ductwork in accordance with the Seismic Restraint System Guidelines, OPM-0043-13 by Mason Industries, Inc.
- D. Provide all piping and ductwork with seismic restraints using seismic hazard level (SHL) "A" as called for in SMACNA's Seismic Restraint Manual Second Edition 1998.
- E. Acceptable Manufacturer:
 - 1. Mason
- F. Vertical Piping:
 - 1. Support vertical piping risers securely with riser clamps, B-Line B3373, or equal. Attach clamps to the pipe above each concrete floor slab, with the arms of the clamp resting on the slab or the structural supports. Provide Superstrut B3373C, or equal clamp when used on copper piping.
 - 2. Support pipe lines passing up through the building at each floor of the building.
- G. Horizontal Piping:
 - 1. Use B-Line B3100, or equal, steel strap hanger for uninsulated steel or cast-iron pipe through 8-inch size, and for insulated steel or cast-iron pipe through 4-inch size.
 - 2. Use Superstrut C-710 or equal, steel hanger in pipe sizes where suitable. Use saddle shield as specified for insulated pipes.
 - 3. For uninsulated copper tubing, use B-Line B3100F, or equal, felt lined hanger.
- H. Pipe Saddles:
 - 1. Use B-Line B3153, or equal, protective insulation shield with "loc" tabs.
- I. Concrete Inserts: Provide B-Line B2500, or equal, concrete inserts.

2.2 VALVE BOXES:

- A. Provide at each valve or cock in ground a Christy, Brooks, or equal valve box with cover marked for service.
- B. Valve boxes in traffic areas: Provide Christy No. G5 traffic valve box, 10-3/8" inside diameter with extensions to suit conditions, with cast iron locking cover.
- C. Valve Boxes in non-traffic areas: Provide Christy No F22, 8" inside diameter by 30" long with cast iron locking cover. Cut bottom of plastic body for operation of valve as required.
- D. Extension Handles
 - 1. Handle to be Alhambra Foundry Co., or equal, model A-3008 extension handle.
 - 2. Furnish 2 extension handles per project for underground valves.

2.3 ACCESS DOORS:

- A. Where floors, walls, or ceilings must be penetrated for access to mechanical equipment, provide access doors, 14-inch by 14-inch minimum size in usable opening. Where entrance of a serviceman may be required, provide 20-inch by 30-inch minimum usable opening.
 - 1. All access doors less than 7'-0" above finished floors and exposed to public access shall have keyed locks.
- B. Access doors shall match those supplied in Division 8 in all respects, except as noted herein.
- C. Where panels are located on ducts or plenums, provide neoprene gaskets to prevent air leakage, and use frames to set door out to flush with insulation.
- D. Provide insulated doors where located in internally insulated ducts or casings.
- E. Where specific information or details relating to access panels different from the above is shown or given on the Drawings or other Divisions of work, then that information shall supersede this specification.
- F. Do not locate access doors in highly visible public areas such as lobbies, waiting areas, and primary entrance areas. Coordinate with the architect when access is required within these areas.
- G. Available Manufacturers:
 - 1. Milcor
 - 2. Karp
 - 3. Nystrom
 - 4. Cesco
- H. Access doors to be equivalent to the following Milcor access doors:
 - 1. Style M (plaster)
 - 2. Style A (A/C tile, gypsum board)
 - 3. Style M (Masonry)
 - 4. Style "Fire Rated" where required.

2.4 ROOF FLASHING:

- A. Flashings in metal deck or membrane type roofing:

1. Flashing for penetrations of the roof for mechanical items such as flues, ducts, and pipes will be furnished and installed under other sections of these specifications. The work of this section shall include layout, sizing, and coordination of penetrations required for the mechanical work.
2. Furnish and install counterflashings above each flashing required in the mechanical work. Flues and ducts shall have 24-gauge galvanized sheet metal storm collar securely clamped to the flue or duct above the flashing.
3. Sewer vents and other piping extending through roof structure shall have flashing provided and installed as part of the roofing work. This contractor shall coordinate his Work accordingly.

B. Flashing in built-up roofing assemblies:

1. Where flashing is not provided and installed as part of other Work, furnish and install a waterproof flashing and counterflashing for pipe, duct, and flue passing through roof. The flashing shall extend a minimum of 9 inches in all directions from the outside of the pipe, flue, or duct.
2. Sewer vents and other piping extending through roof structure shall have four-pound sheet lead flashings and Semco, Smith, or equal to Semco #1100-4, counterflashing sleeves installed as detailed.
 - a. Provide Hydroseal at underside of counterflashings as recommended in Semco installation instructions.
3. Seal all pipes passing through exterior walls in an approved, watertight manner.

2.5 DIELECTRIC UNIONS:

- A. Furnish and install dielectric unions at all locations described herein, whether shown on Drawings or not, and except as noted herein. Construct couplings and flanges so that the two pipes being connected are completely insulated from each other with no metal-to-metal contact. Heavily line the couplings with a hard, insulating, phenolic plastic threaded in standard pipe sizes. Make up the flanges with insulating components consisting of a hard, phenolic gasket, bolt sleeves, and bolt washers. Supplement the insulating gasket with neoprene faces to form a seal.
- B. Acceptable Manufacturers:
1. Watts Regulator Co.
 2. Eclipse, Inc.
 3. Perfection Corp.

2.6 THERMOMETERS:

A. General:

1. Thermometers shall be furnished at all locations shown on the Drawings and in accordance with these specifications, whether shown on the Drawings or not
2. All thermometers, unless shown otherwise, shall be of the bimetal helix or liquid-filled type.
3. All thermometers shall be round, stainless steel case construction with glass front.
4. Accuracy to be within plus or minus one of the smallest scale divisions throughout the entire range.
5. The thermometer scales shall have a minimum of 2 degrees between graduations and a maximum of 20 degrees between figures.
6. The thermometers shall be located so as to be easily read and shall be furnished with adjustable angle pattern so as to be rotated to any position.
7. Liquid thermometers for tanks and similar equipment shall have a minimum 5-inch diameter face.

8. Thermometers for piping shall have a minimum face diameter of 3 inches.
9. Thermometers installed on insulated tanks or piping shall be provided with an extension neck well to compensate for the thickness of the insulation.
10. Thermometers shall be provided with stainless steel stems and steel wells.
11. Thermometers used for air temperature in ductwork, plenum boxes, etc., unless specified or shown otherwise, shall have a minimum scale face of 5 inches and shall have an adjustable mounting flange so that scale may be set at any angle up to 45 degrees to facilitate reading.
 - a. The thermometers shall have a perforated guard over stem suitable for sensing air temperature.
 - b. Length of stem shall be a minimum of 8 inches.
12. Thermometer wells with chain and cap shall be provided where wells are indicated on the Drawings.

B. Provide Pete's Plug II, Sisco P/T, or equal test plug with Nordel core where indicated on drawings.

C. Acceptable Manufacturers:

1. Weston
2. Marsh
3. Taylor
4. Or Equal

2.7 GAUGES:

A. General:

1. Gauges and gauge connections shall be furnished at all locations shown on the Drawings and in accordance with these specifications, whether shown on the Drawings or not.
2. Accuracy to be within 1 percent in the middle third of the dial range and equipped with front calibration.
3. Dials to be white with black numerals.
4. Normal reading to be mid-scale.
5. Provide a needle valve on each gauge connection.
6. Gauge to have bronze bushed movement and front recalibration.
7. Gauges shall have a minimum dial size of 3-1/2 inches.

B. Provide Pete's Plug II, Sisco P/T, or equal test plug with Nordel core where indicated on drawings.

C. Acceptable Manufacturers:

1. Marsh, Series J
2. U.S. Gage
3. Danton 800

2.8 PIPING AND EQUIPMENT IDENTIFICATION:

A. Pipe Identification:

1. Each piping system furnished and installed under this work shall be identified and the direction of flow indicated by a prefabricated coiled plastic colored label.
2. Labels shall comply with ASME A13.1 with regard to color, letter height, and marker size. The labels shall have black or white lettering and flow arrows on colored backgrounds and shall not require adhesive. The background colors shall conform to the color schedule shown in this Article.

3. For use indoors use 20 mil vinyl labels, MSI model MS-970, or equal. For piping with an outside diameter greater than 6 inches provide the label manufacturers nylon straps to secure label to piping.
4. For use outdoors use Polyester/Tedlar laminated material, MSI model MS-977, or equal. For piping with OD greater than 6" provide the label manufacturers stainless steel straps to secure label to piping.
5. The size of the lettering and label shall be such that the lettering can be easily read from the floor and the colors easily discernible.
6. Acceptable Manufacturers:
 - a. Marking Services Incorporated (MSI)
 - b. Idento Metal Products Co., Idento Bands
 - c. Setmark

B. Equipment Identification:

1. Provide white lamacoid plate for each and every piece of equipment installed in this work.
 - a. Lettering on plate shall be black, with size of lettering to suit equipment.
 - b. Lettering shall be minimum of 3/8-inch in height.
 - c. Plates shall be riveted or bolted to equipment.
2. Equipment to include, but not limited to:
 - a. Pumps
 - b. Water Heaters
 - c. Etc.

C. Acceptable Manufacturers:

1. Marking Services Incorporated, (MSI)
2. LEM Products
3. Seton
4. Craftmark

2.9 FIREPROOFING

- A. Fireproofing to be installed at all pipe and duct penetrations of rated assemblies.
- B. Fireproofing to be UL Rated fire stop material.
- C. Acceptable Manufacturers:
1. Hilti
 2. 3M Pro-Set
 3. Or Equal

PART 3 - EXECUTION

3.1 INSTALLATION OF HANGERS AND SUPPORTS:

- A. Fasten all piping securely to structure with hangers, supports, guides, anchors, or sway braces to maintain pipe alignment, to prevent any sagging, and to prevent noise or excessive strain on the piping due to uncontrolled movement under operating conditions. Relocate hangers as necessary to correct unsatisfactory conditions that may become evident when system is put into operation.

- B. Follow drawing requirements and details where special pipe support requirements are detailed on the Drawings.
- C. Do not support piping by perforated tape, wire, rope, wood, nails, or other makeshift devices.
- D. Design hangers and supports to support the weight of the pipe, weight of fluid, and weight of the pipe insulation with a minimum factor of safety of five based on the ultimate tensile strength of the material used.
- E. Burning or welding on any structural member under load shall not be attempted. Field welding not called for on the Drawings or reviewed shop Drawings may only be done with consent and advice of the Architect and after proper provisions have been made to relieve the stress on the member. The boring of holes in beam flanges or narrow members will not be allowed.
- F. Install hanger on insulated piping in a manner which will not produce damage to insulation. Provide steel pipe saddles as required to protect pipe covering. Install pipe hangers on piping covered with insulation on the outside of the insulation and not in contact with the pipe.
- G. Fasten hanger rods to concrete structural members with concrete inserts set flush with surface. Install a reinforcing rod through the opening provided in the concrete inserts. Fasten hanger rods to structural members with suitable beam clamps, and provide beam clips to lock clamp securely to beam.
- H. Use of powder-actuated fasteners will not be permitted for the support of any overhead piping.
- I. Turnbuckles, if used, shall have a load-carrying capacity at least equal to that of the pipe hanger with which they are being used.
- J. All threaded parts of pipe hanger assemblies shall have full length of thread in service while in use.
- K. Hanger material shall be reviewed by the Architect before installation.
- L. Pipe Hanger or Support Spacing:
 - 1. Provide pipe hangers or supports at 6-foot maximum spacing on steel pipe 3/4-inch diameter and smaller and for copper pipe 1-1/2 inches and smaller.
 - 2. Support steel piping 1" and larger and copper larger than 1-1/2 inches at 10-foot maximum spacing.
- M. Provide hangers or supports for horizontal and vertical cast-iron drainage pipe at every other joint, except that when the developed length between hangers or supports exceeds 4 feet, provide hangers or supports at each joint. Provide adequate sway bracing to prevent shear.

3.2 ACCESS DOORS:

- A. Access doors shall be furnished and installed wherever valves, balance valves, damper operating mechanisms, air terminal boxes, fans, and similar items normally requiring adjustment or servicing are installed in concealed or inaccessible spaces. Coordinate with access doors shown on architectural Drawings.
- B. Comply with manufacturer's instructions for installation of access doors.
- C. Where access panels are detailed on architectural or mechanical Drawings, sizes indicated thereon shall be used.

- D. Keyed access doors shall be keyed alike.
 - 1. Provide owner with 4 copies of keys for access doors.

3.3 VALVE BOXES:

- A. Provide valve box for all buried valves. Install per manufacturer's written instructions with top of box flush with finished grade.
- B. Clean all valve boxes of debris.

3.4 ROOF FLASHING:

- A. Provide pipe flashings as noted on the Drawings.
- B. Flue and duct flashings and storm collars shall be securely clamped around flue or duct storm collar or counterflashing, above flashing.

3.5 DIELECTRIC UNIONS:

- A. Install dielectric unions in the following locations:
 - 1. In all metallic water and gas service connections into the building within 5 feet of the building wall. Install adjacent to the shut-off valve or cock and above ground where possible.
 - 2. At points of connections where copper water lines connect to steel domestic water heater tanks and other equipment.
 - 3. At points in piping where dissimilar metal pipes are connected together.
 - 4. Any special applications shown on the Drawings.
 - 5. Where steel or cast-iron pipe in the ground connects to copper or brass piping above the ground, the transition from steel or cast-iron pipe to the copper or brass pipe shall be made above ground in all cases and in an accessible location where practicable.
 - 6. Where copper or brass piping is connected to steel or cast-iron piping and the connection is buried in the ground, the connection shall be covered with coal tar protective tape extending outward a minimum of 5 feet on all pipes, from the point of connection. The tape shall have a minimum thickness of 10 mils and a maximum thickness of 12 mils and shall be applied so as to provide at least two full thicknesses of the tape over the piping. A primer, specifically designed for use with the tape, shall be used. The piping shall be thoroughly cleaned before any tape or primer is applied.

3.6 THERMOMETERS:

- A. Liquid thermometers for piping systems shall be installed so that the liquid flows completely around the bulb.
- B. Enlarge pipes smaller than 2 1/2" for installation of thermometer wells.
- C. Apply thermal grease in thermowells prior to installation of thermometers.
- D. Where shown on the temperature control diagram, the temperature control subcontractor shall furnish and install remote, bulb, panel-mounted, pneumatic-type thermometers. Duct-mounted thermometers may be omitted at these locations.
- E. Locations: Thermometers shall be placed at all locations shown on the Drawings and at locations specified below. Ranges shall be as specified below.
 - 1. In supply from tank, thermostat range to be 30 to 180 degree F.

2. In domestic hot water return systems near circulating pump, thermostat range to be 30 to 180 degree F.

- F. In such cases where the above described thermometers cannot be located so as to be easily read, a remote reading type of thermometer shall be installed, as approved by the Architect.
- G. Thermometers provided as part of the temperature control work and located on a control panel, etc. need not be duplicated by above requirements.

3.7 GAUGES:

- A. Gauges shall have indication of 0 to 160 psi where indicated pressure will be greater than 40 PSI and 0 to 60 psi for lesser pressures.
- B. Provide gauge connections at the following locations:
 1. Inlet and outlet of butterfly-type balancing valves.
 2. Suction and discharge of circulating pump.
 3. Elsewhere as may be shown on the Drawings.
- C. Gauges shall be provided in an convenient location within approximately 5 feet of the flanges or connections and elsewhere as may be shown on the Drawings.
- D. A needle-point globe valve, similar to Crane No. 88, shall be supplied at each gauge and gauge connection.
- E. A gauge siphon located adjacent to the gauge shall be applied with each hot water gauge.

3.8 PIPE AND EQUIPMENT IDENTIFICATION:

- A. Identification shall be applied to all piping, except piping located in furred spaces without access to permit entrance of personnel, and piping buried in the ground or concrete.
- B. Underground pipe identification shall consist of a buried, continuous, preprinted, bright colored, plastic ribbon cable marker provided for each underground pipe.
- C. The legend and flow arrow shall be applied at the following locations:
 1. All valve locations,
 2. All points where piping enters or leaves a wall, partition, cluster of piping, or similar obstruction
 3. All exposed locations
 4. At approximately 20-foot intervals on pipe runs.
- D. Practical variations or changes in locations and spacing may be made with the specific approval of the Architect to meet specific conditions.
- E. Wherever two or more pipes run parallel, the printed legend and other markings shall be applied in the same relative location so that all piping is easily identified.
- F. The marking shall be located so as to be readily conspicuous at all times from any reasonable point of vantage.
- G. Where different equipment, such as fire sprinklers, are supplied from a common main, such as domestic water, the main should be identified as "Domestic Water" and each respective branch takeoff as "Fire Water," etc.

- H. The non-potable water plumbing piping shall be marked with the legend "Danger - Unsafe Water". This legend shall be applied to both hot and cold water systems along the length of the pipe in fluorescent orange at a maximum of five foot intervals.

- I. Lettering size and label colors are to be per ASME/ANSI A13.1 Pipe Marking Standards.

3.9 FIREPROOFING:

- A. Pack the annular space between the pipe sleeves and the pipe and between duct openings and ducts through all floors and walls with UL listed fire stop.
- B. Fireproofing system to be installed in strict accordance with manufacturer's written instructions and details.

3.10 PAINTING:

- A. Perform all priming and painting on the equipment and materials as specified herein.
- B. Exposed piping and unfinished portions of equipment to be painted shall be cleaned of grease, oil, rust, or dirt in preparation for painting.
- C. Where applicable, remove pipe clamps prior to painting so that entire pipe is painted. Provide temporary support as required. Re-install clamps after priming/painting is complete.
- D. Priming:
 - 1. Contractor to prime all exposed ferrous metals, including piping, which are not galvanized or factory-finished.
 - a. Black steel pipe exposed to weather shall be cleaned and primed with one coat of Rust-Oleum, or equal, #1069 primer. Color to be Grey.
- E. See Painting Section for detailed requirements.

3.11 CONCRETE

- A. Where specifically indicated on the Drawings or specified as part of Mechanical Work, this Contractor shall furnish and install concrete work, such as thrust blocks or spring isolator bases.
- B. Concrete and reinforcing steel shall be equal to that specified for General Construction.
- C. Except as noted above, concrete work will be furnished and installed under General Work. This Contractor shall coordinate requirements accordingly.

3.12 EXCAVATING AND BACKFILL

- A. Perform all excavating required for work of this Section. Do excavating required for installation of piping and service lines and other work that applies as indicated on Drawings. Verify location and elevation of all existing utilities prior to excavation for installation of new piping. Provide the services of a pipe/cable locating service prior to excavating activities to determine location of existing utilities.
- B. Excavations shall be of open vertical construction of sufficient width to provide free working space at both sides of trench and around pipe as required for caulking, joining, backfilling, and compacting. Unless shown otherwise, provide a minimum of 2'-6" cover above top of pipe to

finished grade for all service piping unless otherwise noted. Trim trench bottom by hand or provide a minimum of 4" deep sand bed to provide a uniform grade and firm support throughout entire length of pipe. For PE gas pipe, bed the pipe in a 4" sand bed.

- C. Dig trenches straight and true to line and grade with holes for bells for bell-and-spigot pipe. Evenly support piping for its entire length upon outside periphery of lower one-third of pipe. Where rock is encountered, undercut trenches 3 inches and fill with well-tamped, clean sand and pea gravel to correct pipe elevation.
- D. After pipe lines in excavation have been installed and tested, backfill excavation to point 6 inches above pipe using sand, fine earth, or other materials free of rocks and large lumps. Proceed evenly on both sides of pipe and continuously tamp. Except as hereinafter noted, backfill above 6 inches above top of pipe shall be made by using earth from excavation placed in layers of 8-inch maximum depth. Compaction of each successive layer will be made with mechanical compactor.
- E. Take special care in backfilling over wrapped piping to prevent damage to protective wrapping.
- F. Bed sewers under pavements, wrapped piping, and PVC piping in sand prior to backfilling. Backfill to point 6 inches above pipe with sand.
- G. This Contractor shall replace sod, concrete, asphalt paving, curbs, pavement, walks, and any other type of existing work or surface disturbed by excavation, using workmen skilled in trade involved.
- H. When pipe or underground conduit with a protective wrapping is to be placed in the trench, sand only shall be used for bedding the pipe or conduit. The sand used shall be certified to have a minimum resistance of 5000 ohms per cubic centimeter when wetted to any moisture content with distilled water and shall consist of clean, natural, washed-sand, hard, and durable particles varying from fine particles to particles of such size that all will pass through a 3/8-inch screen, not less than 90 percent will pass through a 1/4-inch screen, and not more than 25 percent will pass through a No. 50 screen.
- I. Any backfill placed under this contract which subsides or settles below the adjacent finished grade or paving level during the guarantee period shall be brought to grade by the Contractor by adding compacted backfill or additional paving in paved areas.

3.13 ELECTRICAL WORK:

- A. Adequate working space shall be provided around electrical equipment in compliance with the National Electric Code and other applicable codes or ordinances. The mechanical work shall be coordinated with the Electrical Work in order to comply with these requirements. Any work which does not conform to these regulations shall be properly corrected without additional cost to the Owner.
- B. Furnish and install all line voltage and low-voltage temperature control wiring in the Mechanical Work by the Temperature Control Sub-Contractor, including all interlock wiring between valves, interlock relays, and temperature control equipment. Unless noted otherwise, this does not include primary control wiring between starters and push button or other manual starter switch or branch power circuits required for temperature control systems.
- C. Temperature control equipment, including relays shown on control diagram, shall be furnished and installed by the Temperature Control Subcontractor.

- D. Electrical devices with piping connections, such as solenoid valves, insertion thermostats, strap-on aquastats, and similar items which are to be wired under the Electrical Work or by the Temperature Control Subcontractor, shall be installed by the Mechanical Contractor.
- E. Equipment furnished in this work that is factory wired but requires modification to internal wiring to meet specifications or drawing requirements shall have such internal modifications made at factory before shipment.
- F. All electrical work and equipment, including internal wiring, must comply with applicable codes and applicable portions of electrical specifications. Run line and low-voltage control wiring in conduit. Conduit for temperature control wiring shall be responsibility of Mechanical Contractor and shall be of type specified in electrical specifications.

3.14 CARE AND CLEANING:

- A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in condition satisfactory to Architect. At completion, carefully clean and adjust equipment, fixtures, and trim that are installed as part of this work. Leave systems and equipment in satisfactory operating condition.
- B. Drain and flush piping to remove grease and foreign matter. Thoroughly clean out flush valves, traps, strainers, and pressure-reducing valves.
- C. Keep the interior of all pipes free of dirt, dust, loose insulation, and other foreign materials at all times.
- D. Clean out and remove surplus materials and debris resulting from the work, including surplus excavated material.

3.15 OPERATION TEST:

- A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

3.16 CLEANING UP:

- A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION

SECTION 22 05 23 - VALVES AND ACCESSORIES FOR PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes plumbing accessories including the following:

1. Valves
2. Miscellaneous piping products
3. Hose Bibbs and Hydrants
4. Miscellaneous Drains
5. Cleanouts
6. Floor Sinks

1.2 REFERENCES AND STANDARDS

- A. Requirements of Regulatory Agencies: Contractor to conform to the publications listed below. Requirements of these publications are to be considered as a minimum standard. If details and specifications which require more stringent work are indicated within project, Contractor to provide the more stringent.
1. California Plumbing Code (CPC) Compliance: Comply with applicable portions of the California Plumbing Code pertaining to selection and installation of plumbing materials and products. Fabricate and install natural gas systems in accordance with CPC.
 2. ANSI Compliance: Fabricate and install natural gas piping in accordance with ANSI B21.2, *Fuel Gas Piping*.
 3. NFPA Compliance: Fabricate and install natural gas systems in accordance with latest edition of NFPA 54, *National Fuel Gas Code*.
 4. Utility Compliance: Fabricate and install natural gas systems in accordance with local gas utility company requirements.
 5. ASME B31.9 for building services piping valves.
 6. NSF Compliance: NSF 61 for valve materials for potable-water service
- B. All plumbing components intended to dispense water for human consumption shall comply with requirements of California Assembly Bill AB1953. Components to include (but not limited to): piping, faucets, angle stops, valves, bubblers, drinking fountains, piping, etc.

1.3 ACTION SUBMITTALS

- A. Product data: submit complete data of materials proposed including:
1. Manufacturer and model number
 2. Clearly indicate all options, trim, and accessories.
 3. Cross reference manufacturer's cut sheet to fixture callout ID on submittal sheet.

1.4 CLOSEOUT SUBMITTALS

- A. Warranty: Submit executed warranty.

- B. Certification: Submit Contractors Certification
- C. Operation and Maintenance Data: submit complete O&M data including:
 - 1. Maintenance data and parts lists for each component.
 - 2. Provide "trouble- shooting" maintenance guide.
 - 3. Include this data within maintenance manual.

1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of plumbing piping systems products, of types, materials, and sizes required whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Contractor's Qualifications: Firm with at least 5 years of successful installation experience on projects with piping systems work similar to that required of project.

1.6 WARRANTY

- A. Manufacturer: In addition to the Contractor's Standard Guarantee, furnish Owner with manufacturer's warranty for all plumbing valves and accessories against defects in materials and workmanship. Warranty shall cover replacement of all such valves or accessories plus labor to install.

PART 2 - PRODUCTS

2.1 VALVES

- A. General:
 - 1. Similar valves to be by the same manufacturer.
 - 2. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.
 - 3. Bronze Valves: 2"Ø and smaller with threaded ends, unless otherwise indicated.
 - 4. Ferrous Valves: 2 ½"Ø and larger with flanged ends, unless otherwise indicated.
 - 5. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
 - 6. Valve Sizes: Same as upstream piping unless otherwise indicated.
 - 7. Valve Actuator Types:
 - a. Handwheel: For valves other than quarter-turn types.
 - b. Hand-lever: For quarter-turn valves 6"Ø and smaller, except for plug valves.
 - c. Wrench: For plug valves with square heads.
 - 1) Furnish Owner with 1 wrench for every 5 plug valves, for each size square plug-valve head.
 - 8. Valve-End Connections:
 - a. Flanged: With flanges according to ASME B16.1 for iron valves, ASME B16.5 for steel valves.
 - b. Grooved: With grooves according to AWWA C606.
 - c. Valve solder-joint connections are common in smaller sizes of plumbing piping. Soldering and brazing methods used to achieve required pressure-temperature ratings may damage internal valve parts. Special installation requirements for soldered valves may make threaded valves more cost-effective.

- d. Threaded: With threads according to ASME B1.20.1.
 - e. Valve Bypass and Drain Connections: MSS SP-45.
- B. Acceptable Manufacturers:
- 1. Ball, gate, butterfly, and check valves:
 - a. Nibco
 - b. Apollo
 - c. Milwaukee
 - 2. Balance Valves:
 - a. Bell and Gosset Circuit Setter
 - b. Armstrong
 - c. Nibco
 - 3. Solenoid Valves:
 - a. ASCO
 - b. Or Equal
- C. Ball Valves - $\leq 3''\varnothing$:
- 1. Two-Piece, Full-Port, Lead Free Bronze Ball Valves with Stainless-Steel Trim:
 - 2. NIBCO Model S-585-66-LF or equal.
 - a. Pressure Rating: 600 PSI non-shock cold working pressure
 - b. Maximum pressure / Temperature: 100 PSI AT 300°F
 - c. Body Design: Two piece steel with threaded body packnut design (no threaded stem designs allowed) with adjustable stem packing.
 - d. Body Material: Bronze ASTM B 584 Alloy C844.
 - e. Ends: Threaded or Solder.
 - f. Seats: PTFE or TFE.
 - g. Stem: Stainless.
 - h. Ball: Stainless steel, vented.
 - i. Port: Full.
- D. Gate Valves- $\leq 3''\varnothing$:
- 1. Screw in Bonnet, Rising Stem, Silicon Bronze Gate Valve
 - 2. NIBCO Model T-111-LF or equal.
 - a. SWP Rating: 150 psig
 - b. Maximum Pressure / Temperature: 100 PSI at 300 degree F
 - c. Body Material: Silicon Bronze ASTM B584
 - d. Wedge Material: Silicon Bronze ASTM B584
 - e. Bonnet Material: Silicon Bronze ASTM B584
 - f. Packing Material: Bronze ASTM B62 or ASTM B584 or Brass ASTM B16
 - g. Packing nut: Bronze ASTM B62 or ASTM B584 or Brass ASTM B16
 - h. Handwheel: Malleable Iron ASTM A 47
 - i. End Connections: Threaded
- E. Check Valves – $\leq 3''\varnothing$:
- 1. Horizontal Swing, Regrinding type, Y-patter, Renewable seat and disc bronze check valve
 - 2. NIBCO Model T-413 or equal.
 - a. SWP Rating: 125 psig
 - b. CWP Rating: 200 psig
 - c. Body Material: Bronze ASTM B 62.
 - d. Ends: Threaded
 - e. Seats: Buna-N.
 - f. Hinge: Bronze ASTM B140 Alloy

- F. Check Valves - $\leq 2"$ Ø:
1. Inline lift type bronze ring check valve
 2. NIBCO Model T-480 or equal.
 - a. WWP Rating: 250 psig
 - b. Body Material: Bronze ASTM B 584.
 - c. Stem: Stainless Steel
 - d. Spring: Stainless Steel
 - e. Disc Holder: Stainless Steel
 - f. Disc: Buna-N
- G. Balance Valves:
1. Bell and Gosset Circuit setter or equal
 - a. CWP Rating: 300 psig
 - b. Body: Bronze
 - c. Seat Rings: Caron Filled
 - d. Valve to have differential pressure read-out ports across valve area. Read out ports to be fitted with internal EPT insert and check valve. Valve bodies to have 1/4" tapped drain/purge port.
 - e. Valve to have memory stop feature.
 2. Provide owner with one Bell and Gossett Circuit Setter #RO-2 meter.

2.2 MISCELLANEOUS PIPING PRODUCTS

- A. Trap Primers
1. Provide trap primers as indicated, 1/2-inch size, with built-in air gap. Provide with 1/2-inch shut-off valve.
 2. Where one trap primer will be used for more than one trap, provide a distribution unit (DU-2 through DU-4 as required) with feeder piping for a maximum of four traps.
 3. Acceptable Manufacturers:
 - a. Precision Plumbing Products "Prime Rite"
 - b. Sioux Chief Manufacturing Company "Prime Perfect"
 - c. MiFab "M-500 Series"
- B. Water Hammer Arrestors
1. Water Hammer Arrestors to be provided on both hot and cold water branch piping severing ALL plumbing fixtures (not just flush valves).
 2. Provide water branch lines at single fixtures with a manufactured water hammer arrestor. Water hammer arrestors shall be sized per Plumbing Drainage Institute Standard PDI-WH201 "Water Hammer Arrestors."
 3. Water hammer arrestor to be with nesting type bellows contained within a casing having sufficient displacement volume to dissipate the calculated kinetic energy generated in piping system. Both casing and bellows constructed of Type 304 stainless steel. Arrestor to have a threaded connection.
 4. Where multiple fixtures are located in a row or battery a single or multiple water hammer arrestors, as required, may be used. Multiple fixture installations shall have the arrestor sized and located per standard PDI-WH201 and the manufacturer's installation instructions.
 - a. Provide Access door for water hammer arrestors in restrooms containing more than 1 flush valve type fixture.
 5. All water hammer arrestors shall have male pipe thread connections.
 6. Water hammer arrestor to be a Zurn model Z1700 or equal.
 7. Acceptable Manufacturers:
 - a. Zurn

- b. J.R. Smith
- c. Wade
- d. Amtrol Inc.

C. Piping Escutcheons:

- 1. Provide chrome plated brass pipe escutcheons with inside diameter closely fitting pipe outside diameter or outside of pipe insulation where pipe is insulated.
- 2. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, ceilings, or pipe sleeve extension, if any.
- 3. Furnish pipe escutcheons with nickel or chrome finish and screw or spring clamping device with concealed hinge.

D. Pipe Sleeves:

- 1. Where pipes pass through concrete floors or walls, install galvanized metal or plastic sleeves having not less than 1/2-inch or more than 1-inch clearance around sides of the pipe or pipe covering for the full thickness of the concrete.
- 2. After piping has been installed, fill annular space with fireproof safeing.
- 3. Acceptable Manufacturers:
 - a. Adjustocrete
 - b. Sperzel "Crete-Sleeve"
 - c. Or equal

2.3 HOSE BIBBS AND HYDRANTS

A. Hose Bibbs:

- 1. Where located on interior walls provide Zurn model Z1341 or equal. Hose bibb to have polished bronze body, chrome plated, renewable composition disc, tee key handle, 3/4-inch inlet and hose outlet with non-removable vacuum breaker. Provide with FPT fittings.
 - a. Where hose bibb is located within a Janitors closet or mechanical room, provide with handle.
- 2. Where located on Exterior walls provide Zurn model Z1346 or equal. Hose bibb to have rough brass body, chrome plated, renewable composition disc, tee key handle, 3/4-inch inlet and hose outlet with non-removable non-freeze vacuum breaker. Provide with FPT fittings. .

B. Acceptable manufacturers:

- 1. Zurn
- 2. Woodford
- 3. or equal

2.4 MISCELLANEOUS DRAINS

A. Fixed Air Gap: Zurn model Z-1025 or equal. Fixed air gap to have a dura-coated cast iron body with slop joint inlet and no-hub outlet.

B. Hopper Drain:

- 1. Zurn model Z-325-DB, 7"Ø indirect waste funnel with dura-coated cast iron body, plastic ball float, bronze backwater valve bushing and a replaceable neoprene seat. Provide with optional dome strainer.

2.5 CLEANOUTS

- A. Provide cleanouts of same diameter as pipe shall be installed in all horizontal soil and waste lines where indicated and at all points of change in direction. Cleanouts shall be located a minimum of 18" from building construction so as to provide sufficient space for rodding.
- B. Cleanouts shall have cast iron ferrules and bronze plugs.
- C. Cleanouts extending to floor level shall be provided with membrane flange and clamping collar, bronze raised head plug, and nonslip scoriated top.
- D. Cleanouts to be as follows:
 - 1. Cleanouts in cast-iron soil or waste lines: Zurn Z-1440A-BP.
 - 2. Cleanouts in walls: Zurn Z-1446-A-BP with stainless steel access cover.
 - 3. Cleanouts on exterior of building: Zurn Z-1440.
 - a. Provide stainless steel cover and vandal-proof screw where located in wall. Zurn Z-1446-A
 - b. Where located at grade, provide 18- by 18- by 6-inch concrete pad and Zurn Z-1474 heavy duty cover. Provide Z-1440-A cleanout.
 - 4. Cleanouts in floor to be a Zurn ZN-1400 with the following options:
 - a. Where located in terrazzo floor, provide –T, square top option.
 - b. Where located in carpet, provide –T square top option and –CM carpet marker option.
 - c. Where located in vinyl tile, provide –TX square top recessed for tile option.
- E. Acceptable Manufacturers:
 - 1. Zurn
 - 2. J.R. Smith
 - 3. MiFab

2.6 FLOOR DRAINS, FLOOR SINKS, AND AREA DRAINS

- A. Provide floor sinks size as indicated on Drawings, and type, including features, as specified herein. Provide flashing ring and clamp at floors with waterproofing membrane. Set top of drain slightly below floor to insure drainage unless noted otherwise. Install vented P- trap below each drain.
- B. Provide with trap primer connections at trap where required.
- C. Floor Sinks in Mechanical Room: Zurn Z-566-Y or equal. Floor sink to be a 12"x12" square floor sink with a dura-coated cast iron body with bottom outlet and loose set cast iron secondary strainer. Provide with half grate and sediment bucket.
- D. Acceptable Manufacturers:
 - 1. Zurn
 - 2. J.R. Smith
 - 3. Wade
 - 4. MiFab

PART 3 - EXECUTION

3.1 INSTALLATION OF VALVES:

A. Valve Applications:

1. Domestic Water:
 - a. Shut off valves above grade: Ball Vales
 - b. Shut off valves below grade: Gate Valve
2. Check Valves:
 - a. Piping in horizontal orientation: Swing Check Valve
 - b. Piping in vertical orientation: Lift Check Valve

B. General:

1. Install valves with stems upright or horizontal. Valves stem position to be arranged to allow access for maintenance.
2. Do not install swing check valves in vertical position.
3. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
4. Operate valves in positions from fully open to fully closed prior to installing within system.
5. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
6. Locate valves for easy access and provide separate support where necessary.
7. Install valves in horizontal piping with stem at or above center of pipe.
8. Install valves in position to allow full stem movement.
9. Install check valves for proper direction of flow and as follows:
 - a. Swing Check Valves: In horizontal position with hinge pin level.
 - b. Lift Check Valves: With stem upright and plumb.
10. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.
11. Coordination location of solenoid valves with Controls Contractor. Solenoid valves to be programmed to be open during normal school hours and closed during off hours.
12. Provide union at each connection to equipment and downstream of each valve. Provide unions at both ends of valves when valves cannot be turned due to an obstruction.
13. After piping systems have been tested and put into service, but before final testing, adjusting, and balancing, inspect each valve for possible leaks. Adjust or replace packing to stop leaks; replace valve if leak persists.
14. Tag each valve and provide a complete listing of valve locations and functions.
15. Provide half scale floorplans highlighting location of all valves. Cross reference valve list with floorplans and valve tags.

3.2 PIPE ESCUTCHEONS:

- A. Install pipe escutcheons on each pipe penetration through floors, walls, partitions, and ceilings where penetration is exposed to view and on exterior of building.
- B. Tighten escutcheon to pipe or insulation so escutcheon covers penetration hole and is flush with adjoining surface.

3.3 SLEEVES:

- A. Secure sleeves to metal or wood forms in such a manner that they will not become displaced during pouring of concrete. Fill sleeves on deck with sand.
- B. After forms have been removed from concrete, the sleeves shall be removed from the openings.
- C. Core drill properly sized holes in the concrete to replace metal sleeves that are crushed or knocked out of position during pouring of concrete.
- D. Provide piping passing through concrete fire walls with sleeves of standard black steel pipe nominally one size larger than pipe enclosed, but in the case of insulated pipe, large enough for insulation to pass through. Caulk space between pipe and sleeve with fire-rated wicking, and provide metal retainer plates at both sides of the wall.

3.4 INSTALLATION OF UNIONS AND FLANGES:

- A. Install unions and flanges so that piping can be easily disconnected for removal of tanks, equipment, and valves. Provide a minimum of two unions at each three-way valve.

3.5 CARE AND CLEANING:

- A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work.
- B. At completion of work, carefully clean and adjust equipment and trim installed as part of this work.
- C. Leave systems and equipment in satisfactory operating condition.

3.6 OPERATION TEST:

- A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

END OF SECTION

SECTION 22 07 00 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes insulation types and thickness for plumbing piping and equipment.

1.2 REFERENCES AND STANDARDS

- A. California Code of Regulations – Title 24, Part 4.
- B. California Building Code, California Electric code, NFPA, and UL
- C. ASTM
- D. ASHRAE
- E. NAIMA
- F. NFPA
- G. SMACNA – Sheet Metal and Air Conditioning Contractor’s National Association, Inc.
- H. Underwriter’s Laboratories
- I. GREENGUARD
- J. CAL-GREEN

1.3 ACTION SUBMITTALS

- A. Submit complete data of materials proposed.
 - 1. Indicate individual services for each system.
 - 2. Indicate proposed insulation thickness for each system.
 - 3. Indicate proposed R-values, densities, etc. for each product.
- B. Provide Manufacturer’s installation instructions for each product.

1.4 CLOEOUT SUBMITTALS

- A. Warranty: Submit executed warranty.
- B. Certification: Submit Contractors Certification

1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firm specializing in manufacturing of mechanical insulation products applicable to project whose products has been in satisfactory use in similar services for a minimum of 3 years.
- B. Installer's Qualifications: Company specializing in piping insulation application with a minimum of 3 years experience.
- C. Flame/Smoke Ratings: Insulation materials, including but not limited to insulation, jackets, coverings, sealers, adhesives, etc., to have flame-spread rating of 25 or less and smoke-developed index of 50 or less when tested in accordance with ASTM E84.
- D. Insulating products to be installed in accordance with manufacturer's written instructions and in accordance with recognized industry practices.

1.6 WARRANTY

- A. Manufacturer: In addition to the Contractor's Standard Guarantee, furnish Owner with manufacturer's warranty for insulation against defects in materials and workmanship. Warranty shall cover replacement of insulation plus labor to install

PART 2 - PRODUCTS

2.1 GENERAL

- A. For purposes of this specification, fittings, joints, strainers, flexible piping, valves, etc. shall be considered as piping and shall be insulated with same material and thickness as adjoining piping unless noted otherwise.
- B. Acceptable Manufactures
 - 1. Knauf
 - 2. Johns Manville
 - 3. Certainteed
 - 4. Owens-Corning

2.2 MATERIALS

- A. Fiberglass Piping Insulation:
 - 1. Insulation to be heavy density fiberglass pipe insulation that complies with ASTM C547.
 - 2. Insulation to have factory-applied self-sealing vapor barrier.
 - 3. Maximum K-Value at 75°F = 0.23 Btu-in/hr-FT²-°F.
 - 4. For pipe sizes 1.5 inches in diameter and larger, provide rigid insulation inserts with galvanized metal shields ("Saddles") at hanger locations.
 - a. Shields are not required for pipes 1-1/4" or smaller.
 - 5. Fittings and valves to be insulated with John Manville Zeston 2000 Series 25/50 Smoke-Safe PVC pre-molded insulated covering secured with standard fasteners.
 - 6. Insulation to be Johns Manville Micro-Lok or equal.
- B. Flexible Closed Cell Insulation:
 - 1. Flexible elastomeric thermal closed-cell structure insulation.
 - 2. Maximum K-Value at 75°F = 0.27 Btu-in/hr-FT²-°F.

3. Joints to be sealed with Armstrong 520 Adhesive
4. Insulation to be Armstrong Armaflex 22 or equal

2.3 PIPING INSULATION:

A. Domestic Hot Water Supply and Return:

1. Insulate exposed piping with fiberglass piping insulation with thicknesses as follows:
 - a. Pipes 2"Ø and smaller- 2" thick insulation.
 - b. Pipes 2 1/2"Ø and larger – 2 1/2" thick insulation.
 - c. Exposed pipes installed within 9'-0" of the finished floor to be provided with ASJ-SSL jacket.
2. Insulate concealed piping with fiberglass piping insulation with thicknesses as follows:
 - a. Pipes 1"Ø and smaller with 1" of fiberglass piping insulation.
 - b. Pipes 1 1/4"Ø and larger – insulate with 1 1/2" of fiberglass piping insulation.
3. Do not insulate unions, valves, and exposed run-outs to fixture.
4. For protective pipe insulation at run-outs to fixtures, reference specification section 22.42.00.

B. Domestic Cold Water:

1. Insulate piping exposed to weather with flexible closed cell insulation.
2. Wrap valves and fittings with mastic and z-tape.
3. Insulation to be a minimum of 3/4" thick.
4. Seal all joints with Armstrong 520 adhesive.
5. Insulation exposed to weather to be provided with metal protective jacket. Metal protective jacket to be as follows:
 - a. Sheet Aluminum: ASTM B209, 3003 allow, H-14 temper, 0.016" thick.
 - b. Longitudinal lab to be at least 2" wide.
 - c. Fitting covers: Factory fabricated die shaped type 3003 sheet aluminum, 0.024" minimum thickness.
 - d. Provide 3/8 inch wide, 0.016 inch thick aluminum bands spaced at a maximum of 2'-0" on center.

C. Condensate Drain Piping:

1. Insulated concealed and exposed in building and piping within attic with 3/4" closed-cell pipe insulation.
2. Seal with Armstrong 520 adhesive.

PART 3 - EXECUTION

3.1 GENERAL

- A. Insulation to be stored on jobsite in clean / dry location. Any insulation exposed to water must be discarded immediately and removed from jobsite.

3.2 INSTALLATION OF PIPING INSULATION

- A. Install piping insulation products in accordance with manufacturer's written instructions and in accordance with recognized industry practices.

- B. Installation to be installed after installation of heat tracing, testing, acceptance of testing, and cleaning of pipe.
- C. Insulate each continuous run of piping with full-length units of insulation. Cut pieces to size as required. Do not use multiple cut pieces and/or scraps abutting each other.
- D. Clean and dry piping surfaces prior to insulating. Butt insulation joints firmly together to ensure complete and type fit over surface to be covered.
- E. Install piping insulation without interruption through walls and floors except where otherwise indicated.
- F. Taper raw ends of insulation and seal with canvas and sealant as noted for fittings.
- G. Install pipe hangers on the outside of the insulation.

3.3 INSTALLATION OF EQUIPMENT INSULATION:

- A. Clean and dry all surfaces prior to insulating.
- B. Install insulation materials with smooth and even surfaces. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting in poor workmanship.
- C. Do not apply insulation to equipment breechings or stacks while hot.
- D. Do not insulate manholes, handholds, cleanouts, nameplate, ASME stamp. Provide beveled edge at interruptions of insulation.

3.4 INSULATION REPAIR:

- A. Repair damaged sections of existing and/or new mechanical insulation where damaged occurred during this construction period. Use insulation of same thickness as existing insulation. Install new jacket lapping and seal over existing.

3.5 CARE AND CLEANING:

- A. Repair and/or replace broken, damaged and or otherwise defective insulation. Work to be completed to the satisfaction of the Architect. At completion of work, clean materials installed as part of this work and leave systems and equipment in satisfactory operating condition.
- B. Upon completion of work remove materials, equipment, tools from premises. Leave project area neat, clean and orderly.

END OF SECTION

SECTION 22 11 00 - FACILITY WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes piping for the facility water distribution system.

1.2 REFERENCES AND STANDARDS

- A. Requirements of Regulatory Agencies: Contractor to conform to the publications listed below. Requirements of these publications are to be considered as a minimum standard. If details and specifications which require more stringent work are indicated within project, Contractor to provide the more stringent.
 - 1. California Plumbing Code (CPC) Compliance: Comply with applicable portions of the California Plumbing Code pertaining to selection and installation of plumbing materials and products.
- B. Soldering and Brazing materials and labor shall comply with ASME Code and applicable state labor regulations.
- C. Supports to be in accordance with SMACNA's Seismic Restraint Manual Second Edition 2008.
- D. All plumbing components intended to dispense water for human consumption shall comply with requirements of California Assembly Bill AB1953. Components to include (but not limited to): piping, faucets, angle stops, valves, bubblers, drinking fountains, piping, etc.

1.3 ACTION SUBMITTALS

- A. Submit manufacturer's catalog cut sheets, specifications, installation instructions, and dimensioned drawings for each type of pipe, support, anchor, and seal indicated within this section that is applicable to the project. Clearly indicate item being submitted.
 - 1. Indicate pipe schedules, pressure classes, etc.
 - 2. Indicate all options being submitted.
- B. Provide Brazing Certifications. Submit reports as required for piping work applicable to the project.
 - 1. Brazers that do not have current Certifications shall not be permitted to braze on the project.

1.4 CLOSEOUT SUBMITTALS

- A. Warranty: Submit executed warranty.
- B. Certification: Submit Contractors Certification
- C. Operation and Maintenance Data: submit the following items in O&M data including:
 - 1. Domestic Water System Sterilization Report.

1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of plumbing piping systems products, of types, materials, and sizes required whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Contractor's Qualifications: Firm with at least 5 years of successful installation experience on projects with piping systems work similar to that required of project.

1.6 WARRANTY

- A. Manufacturer: In addition to the Contractor's Standard Guarantee, furnish Owner with manufacturer's warranty for all domestic water piping and accessories against defects in materials and workmanship. Warranty shall cover replacement of piping or accessories plus labor to install.

PART 2 - GENERAL

2.1 GENERAL:

- A. Provide piping materials and factory fabricated piping products of sizes, types, pressure and temperature ratings, and capacities as indicated. Materials and products to comply with the California Plumbing Code.
- B. Where more than one type of material is indicated, selection is the Contractors option.
 - 1. Contractor to provide submittal information on material which is to be installed.
 - 2. Where more than one material is indicated, the Contractor shall only install one material per system and materials shall not be mixed within the same system.
- C. Soldering Materials: Joints in copper tubing for all installations shall be made with brazing alloy sil-fos, or equal. Clean surfaces to be jointed shall be free of oil, grease, rust, and oxides.
 - 1. Harris Stay-Safe 50 solder, or equal, may be permitted on plumbing lines above slab or ground only with prior review for piping sizes 2 inches and smaller only. Solders used shall contain no lead.
- D. Comply with SFA-5.8, Section II, ASME Boiler and Pressure Vessel Code for brazing filler metal materials.

2.2 PIPING AND FITTINGS:

- A. Domestic Water Piping (cold water, hot water, tempered water, and hot water return):
 - 1. Copper Tube: ASTM B 88, Type L, hard-drawn temper, except as otherwise indicated.
 - 2. Interior Water Piping:
 - a. Copper tube, Type L, hard-drawn temper, wrought copper fittings.
 - b. Pipe sizes 2" and smaller to have solder joints.
 - c. Pipe sizes 2 1/2" and larger to have brazed joints.
 - 3. Under Slab Water Piping:
 - a. Pipe sizes 1 1/2" and smaller: Type K, soft Copper tubing with smoothly formed bends. Runs to be made without joints except where runs are longer than the standard length of tubing role.
 - b. Pipe sizes 2" and larger: Same as exterior water piping.

4. Exterior Water Piping:
 - a. Copper tube, Type L, hard-drawn temper, wrought copper fittings.
 - b. All pipe sizes to have brazed joints.
 5. Pro-Press type fittings shall not be considered.
- B. Pressure and temperature relief valve discharge piping:
1. Provide materials as specified for domestic water piping.

PART 3 - EXECUTION

3.1 GENERAL

- A. Examine areas and conditions under which plumbing piping systems are to be installed. Do not proceed with Work until unsatisfactory conditions have been corrected in manner acceptable to Contractor.
- B. Comply with ANSI B31 Code for Pressure Piping.
- C. Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently leak-proof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings but with adequate and accessible unions for disassembly and maintenance/replacement of valves and equipment. Reduce sizes where indicated by use of reducing fittings. Align piping accurately at connections, within 1/16-inch misalignment tolerance.
- D. Locate piping runs, unless detailed otherwise, vertically and horizontally (pitched to drain). Install piping parallel and perpendicular to adjacent building walls/structure and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations. Hold piping close to walls, overhead construction, columns, and other structural and permanent-enclosure elements of building; limit clearance to 1/2-inch where furring is shown for enclosure or concealment of piping; locate insulated piping for 1" clearance outside insulation. Wherever possible in finished and occupied spaces, conceal piping from view by locating in column enclosures, in hollow wall construction, or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.
- E. Electrical Equipment Spaces: Do not run piping through transformer vaults, elevator equipment rooms, Data closets or other electrical or electronic equipment spaces or enclosures.
- F. Should structural difficulties or work of other contractors prevent the running of pipes or the setting of equipment at the points shown, Contractor to make the necessary deviations to the piping system, as determined by the Contractor, with the Architect's review, without additional cost to Owner.
- G. Inspect each piece of pipe and each fitting to see that there is no defective workmanship on pipe or obstructions in pipes and fittings.

3.2 INSTALLATION OF WATER PIPING:

- A. Run all water piping generally level, free of traps or unnecessary bends, arranged to conform to the building requirements, and to suit clearance for other mechanical work such as ducts, flues, conduits, and other work. No piping shall be installed so as to cause unusual noise from the flow of water therein under normal conditions.

- B. Water lines shall not be installed in the same trench with non-metallic sewer lines unless the bottom of the water pipe at all points is at least 12 inches above the top of the sewer line and the water line is placed on a solid shelf excavated at one side of the common trench.
- C. Where water and waste piping cross, the pipes shall have no fittings within 10 feet of the crossing, and the water line shall be run above the waste line. Comply with any local codes or requirements.
- D. Close open ends of water piping each day to prevent contamination or foreign matter entering pipe during construction. Thoroughly flush out piping to remove any dirt or foreign matter. Remove and clean all aerators at end of project and prior to sterilization.

3.3 DOMESTIC WATER SYSTEM STERILIZATION:

- A. Water line disinfections are to be performed by a licensed contractor with training in potable water line disinfections or a D-1 water operator licensed by the state of California and trained in water line disinfections.
- B. Water lines shall be cleaned by following guidelines provided by the AWWA standard C-651 for water mains and guidelines provided by DP Disinfection for building water lines.
- C. Prior to system sterilization, provide warning signs at all outlets while chlorinating the system. Provide sign at all outlets, which reads "Water Sterilization in Progress – Do not operate". Remove signs at conclusion of test.
- D. Disinfection Procedures / 3 Hour Disinfection (Chemical pump Method / Building side of Double Check Valve Assembly):
 - 1. Clean and disinfect all hot and cold water systems connected to the domestic water system in accordance with AWWA Standard C-651 for water mains, DP Disinfection guide lines for building water lines, and as prescribed by the local Building and Health department codes. This procedure shall be performed by a Licensed Contractor trained in the disinfection of water systems or by a state certified Water Operator with a minimum of a D-1 license.
 - 2. Preliminary Preparation:
 - a. Locate the injection point. Install an injection hose bib to the system at a point within 10'-0" of its junction with the water supply line. When the project is complete, with all the fixtures connected and operable and ready for use and when, by test, the system is proved to be free from leaks, it shall be thoroughly flushed by fully opening every outlet and operating every fixture until clear water flows from all of them. Take a Sample, test for Free chlorine content and record it on the work sheet.
 - b. Use (LR) Low Range Disinfection test strips. A Normally reading will be 2mg/L or less. This is the "Bench Mark" reading.
 - 3. Disinfecting Agent:
 - a. The chlorine shall be a registered product with Cal-EPA for use in California in potable water lines, such as Bacticide, Cal-EPA Registration No. 37982-20001. Use liquid Sodium Hypochlorite conforming to ANSI/AWWA B300.
 - 4. Disinfecting Procedure (Chemical Pump Method):
 - a. Connect the chemical pump to the injection hose bibb. If the existing pressure exceeds 50psi use a DP Disinfection Backflow / Regulator Injection Assembly.
 - b. With system completely full of water and supply valve open, adjust every faucet of system so that a trickle of water flows from each. Find the furthest fixture and trickle at a higher rate until you obtain your first reading. Then work backwards.

- c. Inject disinfectant until a test at each branch outlet shows a chlorine residual concentration of 200 parts per million (ppm).
 - d. Close all outlets and valves. Shut down the pump. Close the valve connected to the fresh water supply line. Close the injection hose bib. Maintain condition for 3 hours at 200ppm.
 - e. When the above procedure has been completed, flush out entire system with fresh water until a test at any outlet shows a residual of not more than the original "Bench Mark" reading taken in the preliminary preparation.
 - 1) When flushing, pay attention to any special requirements. Never flush highly chlorinated water into storm drains, creeks, rivers or septic tanks. De-chlorinate the discharge water with Ascorbic Acid.

- E. Disinfection Procedures / 24 Hour Disinfection (Chemical pump Method / Building side of Double Check Valve Assembly):
 - 1. Clean and disinfect all hot and cold water systems connected to the domestic water system in accordance with AWWA Standard C-651 for water mains, DP Disinfection guide lines for building water lines, and as prescribed by the local Building and Health department codes. This procedure shall be performed by a Licensed Contractor trained in the disinfection of water systems or by a state certified Water Operator with a minimum of a D-1 license.
 - 2. Preliminary Preparation:
 - a. Locate the injection point. Install an injection hose bib to the system at a point within 10'-0" of its junction with the water supply line. When project is complete, with all fixtures connected and operable and ready for use and when, by test, the system is proved to be free from leaks, it shall be thoroughly flushed by fully opening every outlet and operating every fixture until clear water flows from all of them. Take a Sample, test for Free chlorine content and record it on the work sheet.
 - 1) Use a L/R (low range) Disinfection test strip or a chlorine meter. A Normally reading will be 2mg/L or less. This is the "Bench Mark" reading.
 - 3. Disinfecting Agent:
 - a. The chlorine shall be a registered product with Cal-EPA for use in California in potable water lines, such as Bacticide, Cal-EPA Registration No. 37982-20001. Use liquid Sodium Hypochlorite conforming to ANSI/AWWA B300.
 - 4. Disinfecting Procedure (Chemical Pump Method):
 - a. Connect the chemical pump to the injection hose bib. If existing pressure exceeds 50psi use a DP Disinfection Backflow / Regulator Injection Assembly.
 - b. With system completely full of water and supply valve open, adjust every faucet of system so that a trickle of water flows from each.. Find the furthest fixture and trickle at a higher rate of speed until you obtain your first reading. Then work backwards.
 - c. Inject disinfectant until a test at each branch outlet shows a chlorine residual concentration of 50 parts per million (ppm).
 - d. Close all outlets and valves. Close Fresh water hose bib. Shut off pump. Close injection hose bib. Maintain condition for 24 hours and chlorine residual of at least 25 ppm must be retained in system for this 24 hour period. If, after 24 hours, tests indicate that chlorine residual concentration has decreased below 25ppm. The disinfection procedure must be repeated until an approved result is obtained.
 - e. When the above procedure has been completed, flush out entire system with fresh water until a test at any outlet shows a residual of not more than the original "Bench Mark" readings taken in the preliminary preparation.
 - 1) When flushing, pay attention to any special requirements. Don't flush highly chlorinated water into storm drains, creeks, rivers or septic tanks. De-chlorinate the discharge water with Ascorbic Acid.

- F. Chemical and bacteriological tests shall be conducted by a state-certified laboratory and approved by the local authorities having jurisdiction.
- G. Submit written report to Health Department as required by State Regulations. Provide a copy of report to Architect prior to completion of project.

3.4 PIPING SYSTEM JOINTS:

- A. General: Provide joints of type indicated in each piping system.
- B. Cut all steel pipe and hard copper tubing by power hacksaw, a circular cutting machine using an abrasive wheel or in square end vise by means of hand hacksaw. Wheel cutters may be used for steel pipe provided that pipe shall have ends reamed to full inside diameter and beveled before being made up into fittings. Pipe shall have round edges or burrs removed so that a smooth and unobstructed flow will be obtained.
- C. Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, Rector- Seal #5, on male threads at each joint and tighten joint to leave not more than 3 threads exposed. Teflon tape may be used on piping smaller than 2 inches.
- D. Braze copper tube-and-fitting joints where indicated, in accordance with ASME B32.
- E. Solder copper tube and fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Solder shall be 95 percent tin, 5 percent antimony and shall be used above grade only. Wipe excess solder from joint before it hardens.
- F. Flanged Joints: Match flanges within piping system and at connections with valves and equipment. Clean flange faces and install gaskets. Tighten bolts to provide uniform compression of gaskets.

3.5 TEST OF PIPING:

- A. Test piping at completion of roughing in, in accordance with the following schedule. Show no loss in pressure or visible leaks after a minimum duration of 4 hours at the test pressures indicated. Tests to be verified by Inspector of Record.

SYSTEM TESTED	TEST PRESSURE PSIG	TEST WITH
Hot, Cold, Tempered, and Hot Water Return Piping	150 lbs. rough-in 100 lbs. after equipment connection	Water

- B. Testing equipment, materials, and labor shall be furnished by this Contractor.

- C. Repair piping systems sections which fail required piping test, by disassembly and reinstallation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.
- D. Drain test water from piping systems after testing and repair work has been completed.

3.6 CLEANING UP:

- A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION

SECTION 22 13 00 - FACILITY SANITARY SEWERAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes piping required for the Sanitary Sewage system.

1.2 REFERENCES AND STANDARDS

- A. Requirements of Regulatory Agencies: Contractor to conform to the publications listed below. Requirements of these publications are to be considered as a minimum standard. If details and specifications which require more stringent work are indicated within project, Contractor to provide the more stringent.
 - 1. California Plumbing Code (CPC) Compliance: Comply with applicable portions of the California Plumbing Code pertaining to selection and installation of plumbing materials and products.
- B. Supports to be in accordance with SMACNA's Seismic Restraint Manual Second Edition 2008.

1.3 ACTION SUBMITTALS

- A. Submit manufacturer's catalog cut sheets, specifications, installation instructions, and dimensioned drawings for each type of pipe, support, anchor, and seal indicated within this section that is applicable to the project. Clearly indicate item being submitted.
 - 1. Indicate pipe schedules, pressure classes, etc.
 - 2. Indicate all options being submitted

1.4 CLOSEOUT SUBMITTALS

- A. Warranty: Submit executed warranty.
- B. Certification: Submit Contractors Certification

1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of plumbing piping systems products, of types, materials, and sizes required whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Contractor's Qualifications: Firm with at least 5 years of successful installation experience on projects with piping systems work similar to that required of project

1.6 WARRANTY

- A. Manufacturer: In addition to the Contractor's Standard Guarantee, furnish Owner with manufacturer's warranty for all sanitary sewage piping and accessories against defects in materials and workmanship. Warranty shall cover replacement of all such piping systems or accessories plus labor to install.

PART 2 - GENERAL

2.1 GENERAL:

- A. Provide piping materials and factory fabricated piping products of sizes, types, pressure and temperature ratings, and capacities as indicated. Materials and products to comply with the California Plumbing Code.
- B. Where more than one type of material is indicated, selection is the Contractors option.
 - 1. Contractor to provide submittal information on material which is to be installed.
 - 2. Where more than one material is indicated, the Contractor shall only install one material per system and materials shall not be mixed within the same system.
- C. Soldering Materials: Joints in copper tubing for all installations shall be made with brazing alloy sil-fos, or equal. Clean surfaces to be jointed shall be free of oil, grease, rust, and oxides.
 - 1. Harris Stay-Safe 50 solder, or equal, may be permitted on plumbing lines above slab or ground only with prior review for piping sizes 2 inches and smaller only. Solders used shall contain no lead.

2.2 PIPING AND FITTINGS:

- A. Sanitary Sewer Piping:
 - 1. Cast iron, no-hub soil pipe. Provide with neoprene sleeve gaskets and stainless steel 4 band couplings.
 - 2. Cast Iron Hub and Spigot Soil Pipe and Fittings: CISPI Standard 301 (Latest Edition) and ASTM A 74.
 - 3. Sanitary Sewer couplings to be super-duty type in conformance with Factory Mutual Standard 1680, Class I and/or ASTM C 1540.
 - a. Couplings to be as follows: "Husky" SD4000, Orange Shield coupling as manufactured by Husky Technologies, or equal. Minimum Shield thickness to be 0.015".
 - b. No-Hub Cast-Iron Soil Pipe Couplings: Couplings for use in connection with no-hub Cast Iron Soil Pipe and Fittings shall comply with CISPI 310. Shield and clamp assembly shall consist of a 300 series stainless steel corrugated shield, stainless steel bands (4-bands minimum), and sealing sleeve in conformance with ASTM C564.
 - 4. At Contractor's option, Type DWV hard drawn copper tubing with cast bronze solder joint fittings and lead free solder may be used above ground in lieu of cast iron drainage fittings. Provide test tees as specified.
 - 5. Acceptable manufacturer's
 - a. Tyler pipe
 - b. AB&I
 - c. Or Equal
- B. Sanitary Vent Piping:

1. Cast iron, no-hub soil pipe. Provide with neoprene sleeve gaskets and stainless steel 4 band couplings.
2. Vent Couplings to be heavy-duty type in conformance with Factory Mutual Standard 1680, Class I and/or ASTM C 1540.
 - a. Couplings to be as follows: "Husky" HD2000, White Shield coupling as manufactured by Husky Technologies, or equal. Minimum Shield thickness to be 0.010".
 - b. No-Hub Cast-Iron Soil Pipe Couplings: Couplings for use in connection with no-hub Cast Iron Soil Pipe and Fittings shall comply with CISPI 310. Shield and clamp assembly shall consist of a 300 series stainless steel corrugated shield, stainless steel bands (4-bands minimum), and sealing sleeve in conformance with ASTM C564.
3. At Contractor's option, Type DWV hard drawn copper tubing with cast bronze solder joint fittings and lead-free solder may be used above ground in lieu of cast-iron drainage fittings. Provide test tees as specified.

PART 3 - EXECUTION

3.1 GENERAL

- A. Examine areas and conditions under which plumbing piping systems are to be installed. Do not proceed with Work until unsatisfactory conditions have been corrected in manner acceptable to Contractor.
- B. Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently leak-proof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings but with adequate and accessible unions for disassembly and maintenance/replacement of valves and equipment. Reduce sizes where indicated by use of reducing fittings. Align piping accurately at connections, within 1/16-inch misalignment tolerance.
- C. Locate piping runs, unless detailed otherwise, vertically and horizontally (pitched to drain). Install piping parallel and perpendicular to adjacent building walls/structure and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations. Hold piping close to walls, overhead construction, columns, and other structural and permanent-enclosure elements of building; limit clearance to 1/2-inch where furring is shown for enclosure or concealment of piping; locate insulated piping for 1" clearance outside insulation. Wherever possible in finished and occupied spaces, conceal piping from view by locating in column enclosures, in hollow wall construction, or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.
- D. Electrical Equipment Spaces: Do not run piping through transformer vaults, elevator equipment rooms, Data closets or other electrical or electronic equipment spaces or enclosures.
- E. Should structural difficulties or work of other contractors prevent the running of pipes or the setting of equipment at the points shown, Contractor to make the necessary deviations to the piping system, as determined by the Contractor, with the Architect's review, without additional cost to Owner.

- F. Inspect each piece of pipe and each fitting to see that there is no defective workmanship on pipe or obstructions in pipes and fittings.

3.2 INSTALLATION OF SANITARY DRAINAGE SYSTEMS:

- A. Make joints between PVC pipe and cast iron pipe or fittings using cast iron adapter fittings, installed as recommended by the manufacturer.
- B. Sewer Piping: Run all horizontal sanitary drain piping inside of building on a uniform grade of not less than 1/4-inch per foot, unless otherwise noted on the plans. Piping shall have invert elevations as shown and slope uniformly between given elevations.
- C. Run all drainage piping as straight as possible and provide easy bends with long turns; make all offsets at an angle of 45 degrees or less.
- D. Grade all vent piping so as to free itself quickly of any water condensation.
- E. Hubless Cast-Iron Joints: Comply with coupling manufacturer's installation instructions and in accordance with CISPI Pamphlet No. 310, latest edition.
- F. Cleanouts: Install in piping as indicated, as required by California Plumbing Code, at each change in direction of piping greater than 45 degrees, at minimum intervals of 50 feet for piping 4 inches and smaller and 100 feet for larger piping, and at base of each conductor.
- G. Flashing Flanges: Install flashing flange and clamping device with each cleanout passing through waterproof membrane.
- H. Install drains in accordance with manufacturer's written instructions and in locations indicated. Unless detailed otherwise, install floor drains and floor sinks with lip of drain slightly below finished floor to ensure drainage. Coordinate with other Contractors to ensure that floor slopes to drain.

3.3 TEST OF PIPING:

- A. Test piping at completion of roughing in, in accordance with the following schedule. Show no loss in pressure or visible leaks after a minimum duration of 4 hours at the test pressures indicated. Tests to be verified by Inspector of Record.

SYSTEM TESTED	TEST PRESSURE PSIG	TEST WITH
All Soil, Waste Drain & Vent Piping; All Storm Drains Within Buildings.	Fill with water to top of highest vent.	Water
Minimum height of standpipe shall be 10 feet above piping being tested.		

- B. Testing equipment, materials, and labor shall be furnished by this Contractor.

- C. Repair piping systems sections which fail required piping test, by disassembly and reinstallation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.
- D. Drain test water from piping systems after testing and repair work has been completed.

3.4 CLEANING UP:

- A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION

SECTION 22 33 00 - ELECTRIC DOMESTIC WATER HEATERS

PART 1 GENERAL

1.1 SUMMARY

- A. This specification section includes plumbing equipment, including:
 - 1. Electric Water Heater
 - 2. Tankless Electric Water Heaters
 - 3. Potable Water Expansion Tanks

1.2 REFERENCES AND STANDARDS

- A. Plumbing Fixture Standards: Comply with applicable portions of the following codes and requirements for all work in this section:
 - 1. California Plumbing Code – CPC
 - 2. American National Standards Institute – ANSI
 - 3. Federal Standards - F.S.
- B. UL and NEMA Compliance: Provide electrical components required as part of plumbing equipment, which have been listed and labeled by Underwriters Laboratories and comply with NEMA standards.
- C. Water heaters to Comply with ANSI/ASHRAE/IES 90A for energy efficiency.
- D. CEC Compliance: Comply with California Electrical Code (ANSI/NFPA 70) as applicable to installation and electrical connections of ancillary electrical components of plumbing equipment.
- E. California Energy Commission Compliance: Provide written confirmation of listing of all water heaters in the "Directory of Certified Water Heaters," latest edition.

1.3 ACTION SUBMITTALS

- A. Product data: submit complete data of materials proposed including:
 - 1. Manufacturer and model number
 - 2. Clearly indicate all options, trim, and accessories.
 - 3. Cross reference manufacturer's cut sheet to fixture callout ID on submittal sheet.

1.4 CLOSEOUT SUBMITTALS

- A. Warranty: Submit executed warranty.
- B. Certification: Submit Contractors Certification
- C. Operation and Maintenance Data: submit complete O&M data including:
 - 1. Maintenance data and parts lists for each type of fixture.
 - 2. Provide "trouble- shooting" maintenance guide

3. Include this data within maintenance manual

1.5 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of plumbing equipment of type and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Grade or quality of materials desired is indicated by trade names or catalog numbers stated herein.
- C. Dimensions, sizes, and capacities shown are minimum and shall not be changed without permission of Architect.

1.6 WARRANTY

- A. Manufacturer: In addition to the Contractor's Standard Guarantee, furnish Owner with manufacturer's warranty for all water heaters and accessories against defects in materials and workmanship. Warranty shall cover replacement of water heater or accessories plus labor to install.
- B. Furnish three-year limited warranty on tank leakage.

PART 2 PRODUCTS

2.1 ELECTRIC WATER HEATERS

- A. Acceptable Manufacturers:
 1. A.O. Smith
 2. State
 3. PVI
- B. General:
 1. Provide commercial electric water heater of size, capacity, recovery rate and electrical characteristics as scheduled on Drawings. Provide UL Listing and NSF approval.
- C. Tank:
 1. All internal surfaces of the tank shall be glass-lined with an alkaline borosilicate composition that has been fused-to-steel.
 2. Tank shall be cathodically protected with adequate extruded magnesium rod.
 3. ASME tank construction for 125 psi working pressure.
- D. Heater:
 1. Working pressure of 150 psi, magnesium anode rod; glass lining on internal surfaces exposed to water.
- E. Heating Elements:
 1. Heavy-duty, medium watt density, with incoloy sheath, thermostat stepped through magnetic contactors

- F. Safety Controls:
 - 1. Double-pole, manual-reset, high-limit, probe- type electric water flow cutoff; both factory wired
- G. Jacket:
 - 1. Equip with full-size control compartments with front panel opening.
 - 2. Insulate tank with vermin-proof glass fiber insulation.
 - 3. Provide outer steel jacket with bonderized undercoat and baked enamel finish.
- H. Accessories:
 - 1. Provide brass drain valve.
 - 2. Provide ASTM temperature and pressure relief valve, minimum size = $\frac{3}{4}$ "Ø.
- I. Controls:
 - 1. Adjustable immersion thermostat; power circuit fusing
 - 2. Control compartment to be hinged and shall house the following:
 - a. 120 volt control circuit transformer
 - b. Transformer fusing
 - c. Magnetic contactor(s)
 - d. Immersion style operating thermostat(s)
 - e. High limit thermostat(s)
 - f. Element fusing per N.E.C.
 - g. Heater to be equipped with night setback operation.
 - h. Heater to be equipped with BACnet compatible ICC gateway.
 - i. Commercial grade incoloy sheathed flange mounted elements with pre-wired terminal leads

2.2 TANKLESS ELECTRIC WATER HEATERS

- A. Acceptable Manufacturers:
 - 1. Eemax
 - 2. Chromomite
 - 3. Or equal
- B. General:
 - 1. Water heater to have external digital temperature control.
 - 2. Unit to be rated for a minimum pressure of 25 PSI and a maximum pressure of 150 PSI
 - 3. Unit to have digital micro-pressing temperate control capable of maintaining outlet temperature.
 - 4. Heating element in heater shall be replaceable cartridge insert.
 - 5. Unit shall have replaceable filter in the inlet connector.
 - 6. Heating element shall be Nickel Chrome material.

2.3 POTABLE WATER EXPANSION TANK

- A. Provide potable water expansion tank at domestic hot water heater as detailed within drawings.
- B. Potable water expansion tank shall be of drawn steel construction. Tank to have a Butyl diaphragm separating the air chamber from the water containing chamber. Inlet connector shall be brass or stainless steel. Materials of manufacture for the diaphragm shall be FDA approved.

- C. Pressure Expansion tank to be as follows:
 - 1. ASME Section VIII Construction
 - 2. Carbon Steel Shell
 - 3. Fixed Butyl Bladder (FDA Approved)
 - 4. Stainless Steel System Connection
 - 5. Pre-charged to 40 PSI (Field Adjustable).
- D. The potable water expansion tank shall be a Watts Series DETA, or equal.

PART 3 EXECUTION

3.1 INSTALLATION OF ELECTRIC HOT WATER HEATERS:

- A. Install electric water heaters as indicated, in accordance with manufacturer's installation instructions and in compliance with applicable codes.
- B. Furnish wiring diagram to Electrical Installer. Refer to Division 26 for wiring of units, not work of this section.
- C. Connect hot and cold water piping to units with shutoff valves and dielectric unions. Connect drain and relief piping as noted on Drawings.
- D. Start-up, test, and adjust electric water heaters in accordance with manufacturer's start-up instructions. Check and calibrate controls.

3.2 POTABLE WATER EXPANSION TANK

- A. Install potable water expansion tank per manufacturer's written instructions. Secure tank to structure with strut-material and steel strap.

3.3 CARE AND CLEANING

- A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in condition satisfactory to Architect. At completion, carefully clean and adjust equipment, fixtures, and trim that are installed as part of this work. Leave systems and equipment in satisfactory operating condition.

3.4 OPERATION TEST

- A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

3.5 CLEANING UP

- A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION

SECTION 22 42 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This submittal section describes plumbing fixtures and trim.

1.2 REFERENCES AND STANDARDS

- A. Plumbing Fixture Standards: Comply with applicable portions of the following codes and requirements for all work in this section:
 - 1. California Plumbing Code – CPC
 - 2. American National Standards Institute – ANSI
 - 3. Federal Standards - F.S.
- B. All plumbing components within the waterways shall comply with the Safe Drinking Water Act (SDWA) “No-Lead” restrictions of ANSI/NSF Standard 61 Section 9.
- C. All plumbing components intended to dispense water for human consumption shall comply with requirements of California Assembly Bill AB1953. Components to include (but not limited to): piping, faucets, angle stops, valves, bubblers, drinking fountains, piping, etc.

1.3 ACTION SUBMITTALS

- A. Product data: submit complete data of materials proposed including:
 - 1. Manufacturer and model number
 - 2. Clearly indicate all options, trim, and accessories.
 - 3. Cross reference manufacturer’s cut sheet to fixture callout ID on submittal sheet.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: submit complete O&M data including:
 - 1. Maintenance data and parts lists for each type of fixture.
 - 2. Provide "trouble- shooting" maintenance guide
 - 3. Include this data within maintenance manual

1.5 WARRANTY

- A. Manufacturer: In addition to the Contractor’s Standard Guarantee, furnish Owner with manufacturer's warranty for all plumbing valves and accessories against defects in materials and workmanship. Warranty shall cover replacement of all such valves or accessories plus labor to install.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All fixtures shall be first class in every respect. Accurately line up finished plumbing. Take special care with the roughing-in and finished plumbing where batteries of fixtures occur.
- B. Consult Architectural Drawings, as well as Plumbing Drawings, for locations, dimensions and mounting height of plumbing fixtures.
 - 1. Take location and mounting heights for roughing-in from Architectural Drawings.
- C. Follow Plumbing fixture rough-in schedule on Drawings for roughing-in connections. Set roughing-in for all fixtures exactly as per measurements furnished by the manufacturers of the fixtures used.
- D. Roughing-in for sinks and lavatories shall be brought in through the wall under the centerline of the drain from the fixture wherever possible and as close to the fixture as possible.
- E. Provide all water supplies to fixtures with compression shut-off stops. Stops to be as follows:
 - 1. IPS inlets with threaded brass nipples at pipe connection
 - 2. Lock shield-loose key.
 - 3. Lead Free
 - 4. Provide combination fixtures with compression stop on each water supply fitting.
 - a. Provide loose key handle for each stop.
- F. Provide 1/2 inch flexible risers for all fixtures, unless otherwise noted. Risers to be as follows:
 - 1. Engineered polymer braided fibers
 - 2. Reinforced PVC inner hose
 - 3. Rubber washers
 - 4. Riser to have brass barbs, stainless steel Ferrules, Brass nut, and rubber washer.
- G. Unless noted otherwise, all finish for exposed metal trim on fixture shall be polished chromium plated.
 - 1. This also applies to wall flanges, nuts, and washers.
 - 2. Trim exposed under sinks shall be considered exposed and to be chromium plated.
 - 3. Handles on all faucets and stops shall be all-metal chromium plated.
- H. Make connection between fixtures and flanges on soil pipe gastight and watertight with neoprene-type gaskets (wall-hung fixtures) or bowl wax (floor outlet fixtures).
 - 1. Rubber gaskets or putty will not be permitted.
- I. P-Traps
 - 1. Provide fixtures not having integral traps with chromium plated P-trap connected to concealed waste within wall and sanitary fittings. Trap to be:
 - a. Tubular Brass
 - b. 17-gauge
 - 2. Provide ADA fixtures waste offsets.
 - 3. Acceptable Manufacturers:
 - a. McGuire Manufacturing
 - b. Dearborn Brass
 - c. Or equal

- J. Unions on waste pipes on fixture side of traps may be slip or flange joints with soft rubber or lead gaskets.

2.2 PLUMBING FIXTURE HANGERS AND SUPPORTS

- A. Install and support plumbing fixtures as required and specified herein.
- B. Carriers and supports
 - 1. Provide as recommended by fixture manufacturer for the particular installation and type of fixture being installed.
 - 2. Residential-type fixture supports are not acceptable.
 - 3. Install floor-mounted water closets with J.R. Smith or equal government pattern cast iron closet flanges with brass bolts, nuts, washers, and porcelain caps secured with spackle.
 - 4. Install wall-hung lavatories in stud walls with concealed arms and floor support, with feet of support securely anchored to floor.
 - a. In addition, anchor top of support to wall construction in an approved manner.
 - 5. Acceptable Manufacturers:
 - a. Zurn
 - b. J.R. Smith
 - c. Josam
 - d. Wade
 - e. By Fixture manufacturer

2.3 WATER CLOSET SEATS

- A. Provide seats for all water closets as scheduled. Seats to be Olsonite model 10SSC or equal as follows:
 - 1. Heavy Duty injected molded high impact solid plastic
 - 2. Elongated bowls
 - 3. Open Front, less cover
 - 4. Self sustaining check hinges
 - 5. Stainless steel posts
 - 6. White color.
- B. Acceptable Manufacturers:
 - 1. Olsonite
 - 2. Bemis
 - 3. or equal

2.4 PLUMBING FIXTURES

- A. Fixtures to be as scheduled on drawings.
- B. Provide stops for all concealed supplies.
- C. Insulate domestic hot water, cold water, and waste piping below ADA plumbing fixtures with Provide ADA Sinks and Lavatories with protective covers "Truebro" Lav Guard Protective Pipe Covers. Protective covers to be:
 - 1. Molded closed cell vinyl pipe covers,
 - 2. Have vandal resistant snap-clip fasteners
 - 3. ASTM E-84 smoke test rating of 0.

- D. Similar fixtures to be by same manufacturer.
- E. Acceptable Manufacturers to be as follows:
 - 1. Water Closets, Urinals, and Lavatories:
 - a. Kohler
 - b. Sloan
 - c. American Standard
 - 2. Stainless Steel Sinks:
 - a. Just
 - b. Elkay
 - c. Or equal
 - 3. Flush Valves:
 - a. Sloan "Royal"
 - b. Or equal
 - 4. Manual Faucets:
 - a. Chicago
 - b. Zurn
 - c. Or Equal

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION

- A. Examine roughing-in work of domestic water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors, substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install plumbing fixtures of types indicated where shown and at mounting height indicated on Architectural Drawings in accordance with fixture manufacturer's written instructions, roughing-in Drawings, and with recognized industry practices. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of the Uniform Plumbing Code pertaining to installation of plumbing fixtures.
- B. In all cases where plumbing fixtures are mounted on or against building walls of concrete or other materials having relatively rough or non-planar surfaces, it shall be the responsibility of this Contractor to provide any necessary grout or backing materials required to facilitate fixture mounting and eliminate void spaces between fixtures and wall to ensure adequate bearing contact.
- C. On completion of installation, provide silicone sealer at all points of fixture contact with walls or floors.
- D. Any fixture broken, cracked, or otherwise damaged during installation must be replaced by Contractor at his own expense.

3.3 TRAPPING AND VENTING OF FIXTURES

- A. Trap and vent all plumbing fixtures in accordance with Uniform Plumbing Code adopted by the Western Plumbing Officials Association and local plumbing codes, whether or not shown on Drawings. Strictly adhere to any local codes. Only exceptions to above will be those fixtures which are specially noted herein or on Drawings to be provided with special wastes.
- B. No vent shall intersect another vent at a point less than 6" above extreme overflow level of highest fixture served.
- C. Take vents off top half of horizontal runs and grade so as to free vents quickly of any water or condensation.

3.4 ADJUSTMENT OF PLUMBING PIPING SYSTEM

- A. Test and adjust fixtures so that each fixture receives the proper amount of water.
 - 1. Adjust flush valves so that each fixture receives the proper amount of water.
 - 2. Regulate all faucets, drinking fountains, etc. to the approval of the Architect so that the entire system is left in first-class condition.
 - 3. Adjust all slow-off valves to turn off between 12-15 seconds.
 - 4. Adjust sensitivity of sensor faucets to the satisfaction of the owner.

3.5 CLEAN AND PROTECT

- A. Clean plumbing fixtures of dirt and debris upon completion of installation.
- B. Protect installed fixtures from damage during the remainder of the construction period.
- C. Clean fixtures, equipment, and materials installed under this contract. Remove cement, plaster, paint and/or rust, etc. Also remove all manufacturers' stickers.
 - 1. Dirt, rubbish, paint spots, or grease on walls or fixtures for which this Contractor is responsible must be removed by him.
- D. Fixtures to not be used by Contractors during construction.

3.6 FIELD QUALITY CONTROL

- A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements.
 - 1. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
- B. Inspect each installed unit for damage to finish. If damaged, cracked, or dented, remove fixture and replace with new unit.

3.7 OPERATION TEST

- A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

3.8 EXTRA STOCK

- A. Furnish special wrenches and other devices necessary for servicing plumbing fixtures and trim to Owner with receipt. Furnish one device for every 10 units.

3.9 TRAINING

- A. Train owner on operation and adjustment of all sensor valves.

3.10 CLEANING UP

- A. After installation and testing but prior to acceptance, Contractor to clean fixtures with mild detergent and water solution, rinse with clean water, and wipe dry.
- B. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION

SECTION 26 00 00 - ELECTRICAL SPECIFICATIONS

PART 1 - GENERAL

1.1 REQUIREMENTS

- A. The requirements of Division 1 are a part of and apply to all work in this Section.
- B. The intent of the drawings and specifications is to construct the remodel in accordance with Title 24, California Code of Regulations (CCR). Should any conditions develop not covered by the contract documents wherein the finished work will not comply with said Title 24, California Code of Regulations, a request for information detailing and specifying the required work shall be submitted to and approved by the Owner before start of any work.

1.2 WORK INCLUDED

- A. This Section describes the requirements for the electric work.
- B. The drawings represent the graphic pictorial portions of the work. The work (meaning all materials, construction methods, and services necessary to complete the total construction project) shall be included in the contractor's bid. The work, including dimensions, quality and workmanship, shall be the responsibility of the contractor.

1.3 CODE COMPLIANCE

- A. Perform all work in accordance with the latest adopted version of the following codes:
 - 1. California Electrical Code (CEC) which adopts, with amendments, the National Fire Protection Association NFPA No. 70, National Electrical Code (NEC), and the California Code of Regulations, Title 24 State Building Standards, Part 3, Basic Electrical Regulations.
 - 2. California Building Code (CBC) which adopts, with amendments, the International Building Code (IBC) and the California Code of Regulations, Title 24, Part 2.
 - 3. California Fire Code (CFC) which adopts, with amendments, the International Fire Code (IFC), and the California Code of Regulations Title 24, Part 9.
 - 4. Occupational Safety and Health Act (OSHA).

1.4 PERMITS, FEES AND INSPECTIONS

- A. Obtain all permits which are required for the work.

1.5 STANDARDS

- A. Comply with the current applicable standards of the listed agencies (e.g. Underwriters Laboratories, Inc. (UL)) for the electrical materials procured and installed. Ensure that the listing is applicable to the way the electrical material will be used. For example, if wire is solely UL listed as Machine Tool Wires and Cables per UL 1063 it shall not be used for wiring in a building.

- B. Underwriters Laboratories, Inc. (UL): Provide a UL label or evidence of UL listing for all electrical material and equipment, unless the material is of a type for which a label or listing service is not provided.
- C. National Electrical Manufacturer's Association (NEMA).
- D. American National Standards Institute (ANSI).
- E. American Society for Testing Materials (ASTM).
- F. Insulated Power Cable Engineers Association.
- G. Certified Ballast Manufacturer's Association.
- H. Factory Mutual (FM) Requirements.

1.6 SUBMITTALS

- A. Provide sufficient information to verify compliance with the contract documents for all material and equipment to be provided under this contract. This includes, but not limited to, the UL listing, manufacturer, model number, ratings (voltage, phase, ampacity, power consumption, short circuit interruption capacity, power, temperature, conductor temperature rating allowed to be terminated on equipment, etc.), structural support information (size, dimensions, weight, center of gravity), NEMA type, accessories, lay outs, installation requirements including clearances, features, usage, gauge, materials it is made from, wire range for terminations, photometrics, compliance statement with applicable codes and standards such as Title 24, California Energy Code, test reports, listings with California Fire Marshal, etc. The manufacturer shall provide documentation describing installation requirements, specifications, operation and maintenance instructions of proposed equipment or systems (e.g., equipment manuals). Submit manufacturer data, shop drawings, and Equipment Manuals for items listed below:
 - 1. Manufacturers Data:
 - a. Power Distribution Equipment (e.g., panelboards, transformers, disconnects)
 - b. Electrical Basic Materials (e.g., conduit, boxes, receptacles, fittings, supports, anchors, firestop material)
 - c. Lighting Fixtures including LED Drivers.
 - d. Lighting Control Equipment including proof that it complies with the requirements of Title 24 of the California Energy Code.
 - 2. Shop Drawings:
 - a. Custom or Non-Stock Equipment.

1.7 MATERIALS AND SUBSTITUTIONS

- A. Materials
 - 1. All material and equipment shall be UL listed, labeled, or certified for intended use by a National Recognized Testing Laboratory (NRTL) as recognized by the U.S. Department of Labor, and OSHA, if such listing is available for that type of material or equipment. Material and equipment shall bear the listing sticker in an accessible location.
 - 2. Provide new material of the quality specified and satisfactory to the Engineer.

3. Provide major equipment from a manufacturer who has, for a period of not less than five years, been a successful manufacturer of similar equipment to that specified. The manufacturer shall provide documentation describing installation requirements, specifications, operation and maintenance instructions of proposed equipment or systems (e.g., equipment manuals).

B. Substitutions:

1. The equipment included in the Contract Documents is used to establish standards of quality, utility, and appearance. Equipment which in the opinion of the Engineer is equal in quality, utility, and appearance will be approved as substitutions to that specified.
2. Products that are specified by manufacturer, trade name or catalog number establish a standard of quality and do not prohibit the use of equal products of other manufacturers provided they are approved by the Engineer prior to bidding.
3. Where items are noted as "or equal", a product of equal design, construction and performance will be considered.
4. Any item proposed as a substitute shall be accompanied by drawings and/or data giving sizes, capacities, all pertinent test data, catalog cut sheets, product information, and all other necessary information required to substantiate that the product is equal or exceeds that specified.
5. Substitutions shall be equal, in the opinion of the Engineer, to the specified equipment. The burden of proof of such shall rest with the Contractor. When the Engineer in writing accepts a substitution, it is with the understanding that the Contractor guaranteed the substituted equipment to be equal to the one specified and dimensioned to fit within the construction. Approved substitutions shall not relieve the Contractor of responsibilities for the proper execution of the work, or from any provisions of the Plans or Specifications.
6. Only one substitution will be considered for each product specified.
7. The Contractor shall be responsible for all expenses in connection with the substitution materials, process, and equipment, including the effect of his/her substitution on him/her, his/her subcontractor's or other Contractor's work. No substitution shall be permitted without written authorization of the Engineer. Any assumptions on the acceptability of a proposed substitution prior to acceptance by the Engineer are at the sole risk of the Contractor.

1.8 DRAWINGS AND SPECIFICATIONS

- A. Data given herein and on the plans are as exact as could be practically secured, but their absolute accuracy is not guaranteed. Plans and specifications are for the assistance and guidance of the Contractor and exact locations, distances, levels, obstructions, existing conditions and other data will be governed by the structures.
- B. Clarification of plans and specifications for the purpose of facilitating construction, but not involving additional labor and materials, may be prepared during construction by the Engineer. Said revised plans and specifications shall become a part of the contract. The Contractor shall conform to the revised plans and specifications at no additional cost to the Owner.
- C. Layouts of equipment, accessories, and wiring systems are diagrammatic but shall be followed as closely as possible. Examine landscape architectural, civil and other drawings, noting all conditions that may affect this work. Report conflicting conditions to the Engineer for adjustment before proceeding with the work. Should the Contractor proceed with work without proper authorization or without reporting the matter, he does so, at his own risk. If the

Engineer determines that corrections are needed because of the contractor's actions, they shall be made as directed by the Engineer at the Contractor's expense.

- D. The right is reserved to make minor changes in locations of equipment and wiring systems shown, providing the change is ordered before conduit runs and/or work directly connected to same is installed and no extra materials are required.

1.9 SUPERVISION

- A. Provide adequate and competent supervision. Maintain complete control of the project execution and complete liability for the materials and work until the project is completed and accepted by the Owner. Provide the project supervisor's name and project telephone number to the Engineer prior to starting work.

1.10 MANUFACTURER'S INSTRUCTION

- A. Follow the manufacturer's instructions when specific installation or connection details are not indicated or specified on the contract documents.
- B. Notify the Engineer of conflicts between the manufacturer's instructions and installation or connection details prior to the installation of materials.

1.11 WORKMANSHIP

- A. Firmly and permanently secure in place all electrical equipment so that it is level, plumb, true and installed such that it will resist seismic movement. Perform all installations in accordance applicable codes, standards (e.g., UL standards), manufacturer's instructions, drawings and specifications and with the methods recommended by the National Electrical Contractors' Standard of Installation. Notify the Engineer of any conflicts between the drawings and specifications and the above prior to the installation of materials.
- B. Cause as little interference or interruption of existing utilities and services as possible. Schedule any power or other utility shutdown with the construction coordinator. Shutdowns which may be required shall be presented to the Owner's Representative for approval two weeks prior to commencement of work. Shutdown work shall be performed on overtime hours if so directed by the Owner.
- C. All UL listed, NRTL, or other listed equipment shall be installed as per listing or labeling (i.e., maximum fuse size means fuse protection required).

1.12 RECORD DRAWINGS

- A. The Contractor shall maintain at the job site office an up to date as-built drawing set showing actual installation of electrical systems and equipment. This set shall contain approved changes and shall be kept clean, up to date and in good condition.
- B. Use this set of drawings for no other purpose.
- C. Where any material, equipment, or system components are installed differently from that shown, indicate differences clearly and neatly using ink or indelible pencil.

- D. At project completion, submit record set of full size drawings and four copies all marked to show final as-built conditions. These shall be turned over to the Owner's Representative upon completion.

1.13 PROTECTION

- A. Protect all equipment and materials required for the performance of this work from damage by the elements, vandalism, or theft during construction.
- B. Do not subject the work and materials of other trades to damage during execution of the work in this division of the specifications.

1.14 COORDINATION WITH OTHER TRADES

- A. Coordinate with other trades and promptly transmit all information required by them. Coordinate the sequence of construction with other trades to ensure that all work proceeds with a minimum of interference and delay.

1.15 EXAMINATION OF SITE

- A. Examine the site prior to bid to determine existing site conditions, which may affect the work. No allowance will be allowed for any extra work required due to a failure to recognize or negligence to discover conditions prior to bid.

1.16 IDENTIFICATION

- A. Install nameplates on electrical equipment including:
 - 1. Circuit breakers, disconnect switches and starters whether provided under this Division or some other.
 - 2. Panelboards and transformers.
 - 3. Terminal cabinets and lighting control panels.
 - 4. Light switches for which the control functions are not evident.
 - 5. Where it is not obvious which piece of equipment is powered from a particular disconnect switch, provide nameplates for both disconnect switch and the powered equipment.
- B. Describe item, control function or sequence of operation on each nameplate.
- C. Fabricate nameplates of laminated phenolic plastic, black front and back with white core. Bevel edges. Engrave through outer layer to produce white letters and numerals. For control pilot devices, engraved metallic plates, filled with enamel, are acceptable. Fasten nameplates to equipment with no. 4 Phillips, round head, cadmium steel, self tapping screws. Use 1/8-inch letters on circuit breakers, switches and other control devices, and 1/4-inch letters on panelboards, switchboards and other major electrical equipment. Submit label designations as part of corresponding equipment submittal. Also in all outdoor equipment and devices.
 - 1. Equipment identification is to indicate the following:
 - a. Equipment ID abbreviation.
 - b. Voltage, phase and wires.

1.17 TESTS

- A. Take precaution during the testing period to insure the safety of personnel and equipment.
- B. Component Tests:
 - 1. Grounding systems, for resistance to earth. Provide additional grounding electrodes, if separately derived system ground resistance exceeds 5 ohms.
 - 2. Lighting circuits, for resistance to ground.
 - 3. Power feeders, for resistance to ground.
 - 4. Check the phase rotation. Verify it is consistent with the facility. Verify it is per the manufacturer's requirements (e.g., some uninterruptible power systems require ABC phase rotation) Verify it is the direction required for the proper machine rotational direction. Notify the Engineer of inconsistencies.
 - 5. Check voltages ensuring that they are within specification for all equipment supplied as part of the scope of work.
 - 6. Check circuit breakers for loose connections and proper operation. Adjust trip settings as required by Engineer.
 - 7. Prior to energizing equipment, check the insulation resistance of feeders sized larger than #2 AWG with a 1000 volt dc "Megger". Minimum insulation resistance values shall not be less than 50 mega ohms.
- C. Functional Tests:
 - 1. Perform all tests suggested by the equipment manufacturers.
 - 2. Verify that everything installed as part of the scope of work functions properly. Verify that any work performed did not adversely affect existing systems or equipment (e.g., that after removing a device from a branch circuit that the remaining existing branch circuit continuity was maintained).

1.18 DEMONSTRATIONS

- A. After testing and final inspection, demonstrate the proper operation of all equipment and systems installed as part of the scope of work to the Engineer and Owner.
- B. Arrange a date for this demonstration with Owner.
- C. Instruct Owner's personnel in operation, adjustment and maintenance of equipment and systems.

1.19 GUARANTEE

- A. Guarantee the electrical work against defects in work or materials for one year after filing of Notice of Completion.
- B. Undertake repairs within 24 hours after notice from the Owner.
- C. If the operation of the electrical system fails to conform to Division 26 requirements or approved submittals, the Owner may operate the electrical system without liability to Owner. Repair or replace defective or unsatisfactory equipment or systems.

PART 2 - PRODUCTS**2.1 RACEWAYS****A. Rigid Steel Conduit:**

1. ANSI C80.1, minimum size 3/4 inch.
2. Threaded fittings, galvanized.
3. Locknuts, 3/4 inch to 1-1/2 inch, heavy nut steel.
4. Locknuts, 1-1/2 inch and larger, malleable iron.
5. Insulated bushings, malleable iron with plastic or nylon insert, OZ IBC threaded series, Raco 113x and 112x series, Appleton "GIB" series or equal.
6. Three piece conduit couplings, malleable iron, T & B Erickson, Appleton EC series, OZ 4 series, or equal.

B. Liquid-tight Flexible Metal Conduit:

1. Fabricate from galvanized steel strip, jacketed with PVC, minimum size 1/2 inch.
2. Straight connectors, cadmium plated steel or malleable iron, insulated throat and neoprene sealing ring, OZ "4Q T" series, T & B "5330" series, Raco 351x and 252x series, or equal.
3. Angle connectors, cadmium plated steel or malleable iron, insulated throat and neoprene sealing ring, OZ, T & B, Raco, or equal, comparable to straight connectors.
4. Hardware, cadmium plated steel.
5. Length, no greater than 18 inches. Allow slack for movement of connected equipment.

C. PVC Conduit:

1. Schedule 40, NEMA TC2, Type II underground installation.
2. Minimum size, 1 inch.
3. Elbows, Schedule 40, encased in concrete for sizes 2 inch and larger.
4. Extensions above grade, rigid steel (exposed), EMT (concealed indoors).
5. Adapters, PVC to rigid steel, threaded plastic.

2.2 SUPPORTING DEVICES**A. Conduit Supports:**

1. Wet locations:
 - a. One hole galvanized malleable iron strap with galvanized malleable or cast iron clamp back, OZ/Gedney Type 14-G.
2. Dry locations:
 - a. Galvanized steel straps, OZ/Gedney Type 5-S and 14-S, T & B, Appleton equivalent, or equal.
3. Plumbers perforated strap is not acceptable.

B. Anchor Methods:

1. Hollow masonry, toggle bolts or spider type expansion anchors.
2. Solid masonry, malleable iron expansion anchors or preset inserts.
3. Metal surfaces, machine screws, bolts or welded studs.
4. Wood surfaces, wood screws, lag bolts.

5. Concrete surfaces, self-drilling anchors or powder driven studs.

2.3 OUTLET, PULL, AND JUNCTION BOXES

- A. Construction: Deep drawn or fabricated interlocked flat pieces with welded tabs, electrogalvanized sheet steel with electrogalvanized hardware. Do not use sectional or gangable boxes.
- B. Size: To accommodate the required number and sizes of conduits, wires, splices and devices but not smaller than the size indicated or specified.
- C. Device Boxes: For single switches and receptacles, provide boxes not less than 4 inches square by 1-1/2 inches deep. For 2 devices, provide boxes not less than 4-11/16 inches square by 1-1/2 inches deep.
- D. Special Mounting: In cabinets, tile, concrete block, brick, stone, wood or similar material, provide rectangular boxes with square corners and straight sides. For single devices, provide boxes 4 inches high by 2-1/2 inches wide by 3-3/8 inches deep. For 2 or more devices, provide multi-gang, non-sectional box with tile or masonry ring.
- E. Lighting Fixtures: 4 inches octagon by 2-1/8 inches deep, minimum. Fit boxes for surface or pendant mounted fixtures with 3/8 inch malleable iron fixture stud.
- F. Cast Metal:
 - 1. Box: Malleable iron.
 - 2. Cover: Gasketed, weatherproof, malleable iron, with stainless steel screws.
 - 3. Hubs: Threaded.
 - 4. Lugs (Cast Mounting) Manufacturers:
 - a. Crouse-Hinds; Type FS or FD.
 - b. Appleton; Type FS or FD.
 - c. Or equal.
 - d. FS or FD.
 - e. Or equal.

2.4 PULL AND JUNCTION BOXES OVER 300 CUBIC INCHES

- A. General: For all pull and junction boxes over 300 cubic inches, provide code gauge, sheet steel boxes which meet NEMA 1 standards for panelboard and terminal cabinet box construction, with screw type covers.
- B. Ground Lug: Weld, before finish is applied, a grounding pad drilled for two bolted grounding lugs or two ground studs on the box interior.
- C. Finish: Apply rust inhibiting prime coat and 2 coats of baked enamel, standard factory grey.
- D. Hardware: Cadmium plated steel screws.

2.5 WIRE AND CABLE

- A. Conductor: Insulated copper, individual conductors, 98 percent conductivity.

1. Power conductors, #12 AWG, minimum to 750 MCM, stranded.
2. Control conductors #14 AWG, minimum to #10 AWG, stranded.

B. Insulation:

1. Rated 600 volts and 90 degree Celsius as follows:

<u>Item</u>	<u>Size (AWG)</u>	<u>Insulation Type</u>
Branch Circuits (dry and damp locations)	#12 to #4/0	THHN
Branch Circuits (wet)	#12 to #4/0	THWN-2 (Okonite for #12-10, or Equal
Fixture Taps (dry & damp)	#12	THHN
Feeders (dry & damp)	#12 to #760 MCM	THHN
Feeders (wet)	#12 to #750 MCM	RHW-2, USE-2, THWN-2, XHHW-2
Controls (dry & damp)	#14 to #10	THHN
Controls (wet)	#14 to #10	THWN-2

2.6 WIRE CONNECTIONS

A. Connect wire to binding post screw, stud, bolt or bus as follows:

1. #10 AWG and smaller conductors, compression type, nylon, self insulated grip spade lugs, T & B "Sta Kon", 3M Scotchlock MNG, Panduit "Pan Term", or equal.
2. #8 AWG to #750 MCM copper conductors, solderless copper lug type connectors, with hex head or allen type compression set screws with configuration to suit application, T & B "Locktite", Burndy "QA", OZ Type "XL" or "XLH", or equal. Use two screw lugs for wire #4/0 and larger.

B. Splice wire as follows:

1. #10 AWG and smaller conductors, twist on solderless, insulated spring connectors, 3M "Scotchlocks", T & B "Piggys" or equal.

C. Size, install and tighten wire terminal and splice connectors in accordance with manufacturer's recommendations.

2.7 TAPE

A. Wire Splices: Vinyl plastic electrical tape, 8.5 mil and 4.0 mil, Scotch 33.

B. Conduit Wrapping: 10 mil vinyl wrapping tape, Minnesota Mining and Manufacturing Company (3M) Scotchwrap 50, Plymoth 4611, or equal.

2.8 WIRING ACCESSORIES

A. Identify conductors with self adhesive vinyl cloth markers, sized to fit the conductor insulation, with machine printed black marking, W.H. Brady, Thomas and Betts, or equal.

B. Wire Ties:

1. Nylon, adjustable, and self-locking.

2.9 LIGHTING FIXTURES

- A. General: Provide fixtures as indicated, factory wired, ready for field connection.
- B. For surface mounted fixtures provide all blocking, mounting channels required and hardware for mounting.
- C. Provide fixtures UL approved for installation against low density ceilings where applicable. Do not use spacers.

2.10 LED Luminaires:

- A. Components: UL 8750 recognized or listed as applicable.
- B. Tested in accordance with IES LM-79 and IES LM-80.
- C. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
- D. 75CRI minimum outdoor lighting, 90 CRI minimum indoor.
- E. Kelvin temperature as specified.

2.11 Lighting Control devices

- A. Provide lighting control devices (e.g., automatic time switch control device, motion sensor, occupant-sensor, photosensor, automatic daylighting control device) that meet the State of California, Title 24, State Building Standards, Part 6, California Energy Code, 2016 Edition and that have been certified to the commission.
- B. Provide dimmers that are compatible with the provided LED drivers and ballasts.

PART 3 - EXECUTION

3.1 RACEWAY SYSTEMS

- A. Install all wiring in raceways. Install raceway systems, including conduits, hangers and support channels parallel or perpendicular to structural members. Coordinate location of raceway systems with other Divisions prior to commencing installation.
- B. Rigid Steel Conduit: Suitable for use in all locations. For underground installations tape wrap conduit completely with tape suitable for underground installations, double lap of Calpico 10 mil or equal.

- C. Liquid Tight Flexible Metal Conduit: Suitable for connection of equipment in damp or wet locations.
- D. PVC Conduit: Suitable for use underground, with a minimum of 18 inches of cover. Fabricate field bends with an approved thermal bender and jig. For underground emergency systems encase conduit in concrete, minimum of 2" all around. Maintain separation between conduits using plastic spacers specifically designed for the purpose.
- E. Conduit Supports:
 - 1. Support all conduits at intervals not to exceed 10 feet.
 - 2. Support individual conduits with conduit hangers or clamp back and nest back, if required for entrance into the equipment.
 - 3. Spring steel fasteners may be used to fasten electrical metallic tubing to individual all threaded rod, not hanger wires, specifically used for hanging up to 1" conduit, nothing else.
- F. Conduit Bends:
 - 1. Electrical conduits: Provide no more than (3) 90 degree conduit bends or the equivalent number of smaller radius bends in any conduit run between boxes or equipment.
 - 2. Length of run: 400 feet maximum, less 100 feet for each equivalent 90 degree bend.
 - 3. Radius of Underground Bends: Minimum 8 times conduit radius. (power)
 - 4. Fabricate bends and offsets with a hickey or conduit bender designed specifically for use with the type of conduit to be bent, or use factory made bend.

3.2 BOXES AND CABINETS

- A. Place outlet boxes in a location as close to that shown on the plans as possible. Coordinate location of boxes with other Divisions.
- B. Install wall mounted outlet boxes so that the distance from the centerline of the box to finished floor is as listed or indicated on plan:
 - 1. Receptacles, + 1 foot-6 inches (18")
- C. Install junction boxes with covers accessible after installation.
- D. Attach surface boxes with:
 - 1. Steel or malleable iron expansion anchors in concrete or solid masonry.
 - 2. Wood screws in wood.
 - 3. Toggle bolts in hollow walls or masonry.
 - 4. Machine screws, bolts or welded studs in steel.
- E. For all surface mounted boxes or cabinets mounted-in wet or damp locations provide weatherproof enclosures and at least 1/4 inch air space between box and mounting surface, per CEC 312.2.

3.3 INSULATED CONDUCTORS AND CABLE

- A. Exercise extreme care when pulling conductors and cable into conduits to avoid kinking, twisting, nicking or scratching of the insulation or the placement of extreme stress on the conductors or cable. When required, utilize UL approved pulling compounds to assist in pulling conductors.
- B. Color code conductors by phase sequence A-B-C when looking into the front of the equipment from left-to-right, top to bottom or front-to-back. Provide conductors with the appropriate phase color or mark conductors with a minimum of 6 inches of phase tape on ends connected to terminals. Phase code conductors as listed:

<u>Voltage</u>	<u>Phase A</u>	<u>Phase B</u>	<u>Phase C</u>	<u>Neutral</u>	<u>Ground</u>
120/240	Black	Red	Orange	White	Green

- C. Identify each conductor with its respective circuit number at each box or terminal.
- D. Connections:
 - 1. Utilize twist-on solderless connectors for splicing receptacle and lighting circuits #10 AWG wire size and smaller.
 - 2. Splices and taps will not be permitted for other than receptacle and lighting circuits, or for wire larger than #10.
 - 3. Terminate conductors at motors with bolted connections, insulated with plastic tape.

3.4 WIRING DEVICES

- A. Connect wiring devices to circuits indicated using side or back wiring terminals.
- B. Connect green grounding pigtail from receptacles to outlet box with screw.
- C. Install wiring devices flush with the device plate fronts.
- D. Align plates plumb with wall, and cover opening, without use of "jumbo" plates.
- E. Install receptacles with grounding terminal up.

3.5 GROUNDING

- A. Permanently and effectively ground all raceway systems, supports, cabinets, switchboards, control equipment, motor frames, lighting fixtures and other utilization apparatus.
- B. Provide a ground wire in each conduit carrying circuits operating at 100 Volts or higher bonded at each end to equipment. Size as shown on the drawings or per CEC.

3.6 ELECTRICAL WORK FOR EQUIPMENT

- A. Provide all connections to equipment requiring electrical supply.
- B. Review other disciplines requirements for additional work required.

3.7 LIGHTING FIXTURES

- A. Install lighting fixtures complete with lamps, ready for operation.
- B. Secure fixtures to the structure by means of brackets, flanges and other mounting hardware suited for the fixtures and type of installation.
- C. Secure surface mounted fixtures with a minimum of (2) 1/4 inch bolts into substantial structure (not just into a gypsum board ceiling), or as detailed.
- D. Clean lighting fixtures prior to final acceptance.

3.8 LIGHTING CONTROL DEVICES

- A. Install in accordance with the manufacturer's instructions and the State of California, Title 24, State Building Standards, Part 6, California Energy Code.
- B. Program system for proper operation and per Owner's representative schedule of operation, maintaining compliance with Title 24.
- C. Instruct Owner's representative personnel in reprogramming and scheduling and maintenance of devices and lighting control panel.

END OF SECTION

SECTION 31 23 33 - TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 015000, Construction Facilities and Temporary Controls.
- B. Section 330000, Site Utilities.

2.1 QUALITY ASSURANCE

- C. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.
- D. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.
- E. Contractor / Installer shall have been in business for five (5) years providing/finishing similar size projects and complexity.

1.2 SUBMITTALS

- A. Submit Manufacturers data and shop drawings.

1.3 WARRANTY

- A. Submit fully executed warranty for work and materials in this section.

1.4 REFERENCES AND STANDARDS

- A. California Building Code current edition.
- B. California Plumbing Code current edition.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Transport, store and handle in strict accord with the local jurisdiction.
- B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

C. PROJECT CONDITIONS

- D. Contractor shall acquaint himself with all existing site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.
- E. Field verify that all components, backing, etc. by others are installed correctly to proceed with installation of products as herein specified.
- F. Trench dewatering may be necessary. Contractor shall provide any and all tools, equipment and labor necessary for trench dewatering no matter what the source. Dewatering shall be continuous until all site utilities are installed and backfilled.

1.6 PROTECTION

- A. Adequate protection measures shall be provided to protect workers and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations. Repair all trenches in grass areas with new sod (seeding not permitted) and "stake-off" for protection.
- B. Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.
- C. Any construction review of the Contractor's performance conducted by the Architect or Owner is not intended to include review of the adequacy of the Contractor's safety measures, in, on or near the construction site.
- D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gulying of sides of excavation.
- E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. Keep all excavations free from water during entire progress of work, regardless of cause, source or nature of water.
- F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.
- G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance.
- H. Trees: Carefully protect existing trees which are to remain.

1.7 TRENCH SAFETY PROVISIONS

- A. General Contractor shall be solely responsible for safety design, construction and coordination with agencies having jurisdiction. If such plan varies from shoring system standards established by Construction Safety Orders, plan shall be prepared by registered civil or structural engineer.

- B. Nothing herein shall be deemed to allow use of shoring, sloping or protective system less effective than that required by Construction Safety Orders of California State Division of Industrial Safety.
- C. When trenching through paved surface, provide steel trench plates to cover open trenches daily until trenches are backfilled.

1.8 SEASONAL LIMITS

- A. No backfill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, full operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.
- B. Material above optimum moisture shall be processed per section 310000, 3.08, B.

1.9 TESTING

- A. General: Refer to Section 014500 – Quality Requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Backfill materials: Pipeline and conduit trench backfill as shown on the plans and as specified below.
 - 1. ¾ inch crush rock.
 - 2. Native Materials: Soil native to Project Site, free of wood, organics, and other deleterious substances. Rocks shall not be greater than __-inches.
 - 3. Sand: Fine granular material, free of organic matter, mica, loam or clay.
 - 4. Lean Mix Concrete/Controlled Density Backfill: 2 sacks cement slurry.
 - 5. Class 2 aggregate base, ¾" rock, per Caltrans section 26-1.02B
- B. Water: Furnish all required water for construction purposes, including compaction and dust control. Water shall be potable.
- C. Provide other bedding and backfill materials as described and specified in Section 310000, Section 334000 and Divisions 15 and 16.

PART 3 - EXECUTION

1.1 INSPECTION

- A. Verification of Conditions:
 - 1. Examine areas and conditions under which work is to be performed.
 - 2. Identify conditions detrimental to proper or timely completion of work and coordinate with General Contractor to rectify.

3.2 COORDINATION

- A. General Contractor shall coordinate work as herein specified, in accordance with drawings and as required to complete scope of work with all related trades.

3.3 INSTALLATION

- A. Perform work in accordance with pipe manufacturer's recommendations, as herein specified and in accordance with drawings.

3.4 TRENCHING

- A. Make all trenches open vertical construction with sufficient width to provide free working space at both sides of trench around installed item as required for caulking, joining, backfilling and compacting; not less than 12 inches wider than pipe or conduit diameter, unless otherwise noted.
- B. Carefully excavate around existing utilities to avoid unnecessary damage. The contractor shall anticipate and perform hand work near existing utilities as shown on the survey, without additional claims or cost.
- C. Trench straight and true to line and grade with bottom smooth and free of edges or rock points.
- D. Where depths are not shown on the plans, trench to sufficient depth to give minimum fill above top of installed item measured from finish grade above the utility as follows:
 - 1. Sewer pipe: depth to vary
 - 2. Storm drain pipe: depth to vary
 - 3. Water pipe – Domestic Supply: 30 inches
- E. Where trench through existing pavement saw cut existing pavement in straight lines. Grind existing asphalt on each side of trench 3" wide x 1/2 the depth of the section. Apply tack coat to vertical surfaces before installing new asphalt. Replace asphalt and concrete pavement sections to matched existing conditions. In concrete pavement provide expansion and control joints to match existing joint layout.

3.5 BACKFILL

- A. Pipe Trench Backfill is divided into three zones:
 - 1. Bedding: Layer of material directly under the pipe upon which the pipe is laid.
 - 2. Pipe Zone: Backfill from the top of the bedding to 6 inches (compacted) over the top of the pipe.
 - 3. Upper Zone: Backfill between top of Pipe Zone and to surface of subgrade.
- B. Bedding: Type of material and degree of compaction for bedding backfill shall be as defined in the Details and Specifications.
- C. Pipe Zone and Upper Zone Backfill:
 - 1. Type of material and degree of compaction Pipe Zone and Upper Zone Backfill shall be as required by Drawings, Details, & Specifications.

2. Upper Zone Backfill shall not be placed until conformance of Bedding and Pipe Zone Backfill with specified compaction test requirements has been confirmed.
3. Backfill shall be brought up at substantially the same rate on both sides of the pipe and care shall be taken so that the pipe is not floated or displaced. Material shall not be dropped directly on pipe.

D. Backfill Compaction:

1. Backfill shall be placed in layers which, when compacted shall not exceed 6 inches in thickness. Each layer shall be spread evenly and thoroughly mixed to insure uniformity. Do not backfill over, wet, frozen or soft subgrade surfaces. Employ a placement method that does not disturb or damage foundation walls, perimeter drainage, foundation damp-proofing, waterproofing or protective cover.
2. When moisture content of fill material is below that required to achieve specified density, add water until proper moisture content is achieved. When moisture content is above that required, aerate by blading or other methods until specified moisture content is met, see section 310000, 3.08, B.
3. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted to 95% of maximum dry density while at specified moisture content. Compact each layer over its entire area until desired density has been obtained.
4. The top 6 inches of subgrade compaction under pavement or building shall be per Earthwork section 310000.
5. Compaction: All backfill operations shall be observed by the Inspector of Record and/or Geotechnical Engineer. Field density tests shall be made to check compaction of fill material. If densities are not satisfactory, Contractor will be required to change equipment or procedure or both, as required to obtain specified densities. Notify Inspector and Architect at least 24 hours in advance of any operation.

3.6 TRENCH AND SITE RESTORATION

- A. Finished surface of trenches shall be restored to a condition equal to, or better than the condition as existed prior to excavation work.

3.7 PROTECTION

- A. Protect existing surfaces, structures, and utilities from damage. Protect work by others from damage. In the event of damage, immediately repair or replace to satisfaction of Owner.
- B. Repair existing landscaped areas to as new condition. Replant trees, shrubs or groundcover with existing materials if not damaged or with new materials if required. Replace damaged lawn areas with sod, no seeding will be permitted.
- C. Replace damaged pavement with new compatible matching materials. Concrete walks to be removed to nearest expansion joint and entire panel replaced. Asphalt to be cut neatly and replaced with new materials.
- D. Any existing materials removed or damaged due to trenching to be returned to new condition.

3.8 SURPLUS MATERIAL

- A. Remove excess excavated material, unused materials, damaged or unsuitable materials from site.

3.9 CLEANING

- A. Contractor will keep the work areas in a clean and safe condition so his rubbish, waste, and debris do not interfere with the work of others throughout the project and at the completion of work.
- B. After completion of work in this section, remove all equipment, materials, and debris. Leave entire area in a neat, clean, acceptable condition.

END OF SECTION

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Walks.
- B. Related Sections:
 - 1. Section 033053 "Miscellaneous Cast-in-Place Concrete" for general building applications of concrete.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Other Action Submittals:
 - 1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For the following, from manufacturer:
 - 1. Cementitious materials.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Fiber reinforcement.
 - 4. Admixtures.
 - 5. Curing compounds.
 - 6. Applied finish materials.
 - 7. Bonding agent or epoxy adhesive.
 - 8. Joint fillers.
- B. Material Test Reports: For each of the following:
 - 1. Aggregates.

1.5 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- C. ACI Publications: Comply with ACI 301 unless otherwise indicated.

1.6 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of **[40 deg F for oil-based materials] [55 deg F for water-based materials]**, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from steel wire into flat sheets.
- B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
- C. Reinforcing Bars: ASTM A 615, Grade 60; deformed.
- D. Joint Dowel Bars: ASTM A 615, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.
- E. Epoxy-Coated, Joint Dowel Bars: ASTM A 775; with ASTM A 615, Grade 60, plain-steel bars.
- F. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.
- G. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

- H. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
- I. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating, compatible with epoxy coating on reinforcement.
- J. Zinc Repair Material: ASTM A 780.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, gray portland cement Type I/II. May supplement 15% max. by weight with the following:
 - a. Fly Ash: ASTM C 618, Class N or Class F. Class C not permitted.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - 2. Blended Hydraulic Cement: ASTM C 595, Type IS.
- B. Normal-Weight Aggregates: ASTM C 33 uniformly graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: 1 inch nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: Complying with ASTM C 94 or ASTM C 1602.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.4 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry or cotton mats.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.

- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.5 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, 3/8" asphalt-saturated cellulosic fiber in preformed strips or as accepted by the Architect.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:
 - 1. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.6 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 3000 psi.
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
 - 3. Slump Limit: 4 inches plus or minus 1 inch.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
 - 1. Air Content: 3 percent plus or minus 1.5 percent for 1-inch nominal maximum aggregate size.
- D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For concrete batches larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 - 2. Provide tie bars at sides of paving strips where indicated.
 - 3. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
 - 1. Locate expansion joints at intervals of 10 feet unless otherwise indicated.
 - 2. Extend joint fillers full width and depth of joint.
 - 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 - 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 - 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 - 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent concrete paving.
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
 - 2. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, reinforcement, and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- K. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - 3. Fog-spray forms, reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-

driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

3.9 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 1. Elevation: 3/4 inch.
 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
 3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/2 inch.
 4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
 5. Lateral Alignment and Spacing of Dowels: 1 inch.
 6. Vertical Alignment of Dowels: 1/4 inch.
 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
 8. Joint Spacing: 3 inches.
 9. Contraction Joint Depth: Plus 1/4 inch, no minus.
 10. Joint Width: Plus 1/8 inch, no minus.

3.10 WHEEL STOPS

Retain this article if wheel stops are required.

Retain first paragraph below where permanently installed HDPE or recycled rubber or plastic stops are required or in addition to mechanical attachment.

- A. Install wheel stops in bed of adhesive applied as recommended by manufacturer.

- B. Securely attach wheel stops to paving with not less than two **[galvanized-]**steel dowels located at one-quarter to one-third points. Install dowels in drilled holes in the paving and bond dowels to wheel stop. Recess head of dowel beneath top of wheel stop.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- C. Test results shall be reported in writing to Architect and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- E. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- F. Concrete paving will be considered defective if it does not pass tests and inspections.
- G. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.12 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 33 00 00 - SITE UTILITIES

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The work includes, but is not necessarily limited to, the following:
 - 1. Domestic water piping system.
 - 2. Sewer piping system.
- B. Other items that may be specified or shown on the Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 015000, Construction Facilities and Temporary Controls.
- B. Section 312333, Trenching and Backfilling.

1.03 QUALITY ASSURANCE

- A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the drawings to be salvaged and re-used.
 - 1. Sun damaged or discolored PVC pipe will be rejected.
- B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.
- C. The representatives of the Owner's testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner's testing lab representatives nor the testing by the Owner's testing lab shall excuse the contractors or subcontractors for defects or deficiencies discovered in their work during or following completion of the project. Correcting inadequate compaction is the sole responsibility of the contractor.
- D. Contractor shall be solely responsible for all subgrades built. Any repairs resulting from inadequate compaction or incorrect grades will be the responsibility of the contractor.

1.04 SUBMITTALS

- A. Refer to Section 013300.
- B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.
- C. Provide sieve analysis from accredited testing lab on pipe bedding material. Analysis shall have a current date not older than project contract signing date.

- D. Substitution: Provide all data of proposed material being submitted as a substitution. Provide comparison with specified product data and identify all differences. Failure to provide comparison will be reason for rejection.

1.07 REFERENCES AND STANDARDS

- A. ANSI/ASTM D698-00 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
- B. ANSI/ASTM D1556-00 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- C. ANSI/ASTM D1557-02 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18 inch (457 mm) Drop.
- D. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).
- E. ANSI/ASTM D 4318-05 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.
- F. CAL-OSHA, Title 8, Section 1590 (e).
- G. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified.
- H. California State Health and Safety Code Section 116875, Lead Free Public Water Systems.
- I. California Plumbing Code, current edition.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Transport, store and handle in strict accord with the local jurisdiction.
- B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.09 PROJECT CONDITIONS

- A. Existing civil, mechanical and electrical improvements are shown on respective site plans to the extent known. Should the Contractor encounter any deviation between actual conditions and those shown, he is to immediately notify the Architect before continuing work.

1.10 EXISTING SITE CONDITIONS

- A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.11 PROTECTION

- A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.
- B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.
- C. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.
- D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gullyng of sides of excavation.
- E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to provide pumps and all equipment necessary to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.
- F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.
- G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.
- H. Trees: Carefully protect existing trees that are to remain. Provide temporary irrigation as necessary to maintain health of trees.

1.12 SEASONAL LIMITS

- A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

1.13 RECORD DRAWINGS

- A. Keep a daily record of all pipe placed in ground, verified by Project Inspector.
- B. Upon completion of this Contract, furnish one tracing showing all outside utility lines, piping, etc., installed under this Contract. Locate and dimension all work with reference to permanent landmarks.
- C. All symbols and designations used in preparing "RECORD" drawings shall match those used in Contract drawings.

- D. Properly identify on as-builts and provide dimensions for all stubs for future connections. Provide concrete markers 6" dia. 12" deep, flush with finish grade at the ends of all stubbed pipes.

PART 2 – PRODUCTS

2.01 MATERIALS - GENERAL

- A. Provide each item listed herein or shown on drawings of quality noted or approved equal. All material shall be new, full weight, standard in all respects and in first-class condition. Insofar as possible, all materials used shall be of same brand or manufacture throughout for each class of material or equipment. Materials shall be of domestic manufacture and shall be tested within Continental United States.
- B. Grade or quality of materials desired is indicated by trade names or catalog numbers stated herein.
- C. Dimensions, sizes, and capacities shown are minimum and shall not be changed without permission of Architect.
- D. All materials in this section used for any public water system or domestic water for human consumption shall be lead free.
 - 1. For the purposes of this section, "lead free" means not more than 0.2 percent lead when used with respect to solder and flux and not more than 8 percent when used with respect to pipes and pipe fittings.
 - 2. All pipe, pipe or plumbing fitting or fixtures, solder, or flux shall be certified by an independent American National Standards Institute (ANSI) accredited third party, including, but not limited to, NSF International, as being in compliance with this section.
- E. All materials used for fire system piping shall be UL and FM approved.

2.02 VALVE BOXES

- A. Provide at each valve or cock in ground a Christy, Brooks, or equal to Christy G05CT, concrete valve box with cover marked for service, domestic water shall be marked "Water" and fire supply shall be marked "Fire". Furnish extension handles for each size square nut valve, and provide "fork" handle for each size of "wheel handle" valve as required. Do not locate valve boxes in walk, or covered passages, curbs, or curb & gutters, unless necessary. If valve location is within concrete or asphalt paved surface valve box shall be as detailed on plans for such condition. Provide valve box extensions as required to set bottom of valve box to bottom of piping in which valve is installed. Provide Owner with set of special wrenches and/or tools as required for operation of valves.

2.03 PIPES AND FITTINGS

- A. Sanitary Sewer: PVC sewer pipe and fittings with Ring-Tite joints, ASTM D3034 SDR35.
- B. Domestic water Lines 3 1/2" and smaller: Schedule 80 PVC.
- C. Solder: Lead Free. 95/5; 95% Tin / 5% Antimony.

2.04 CLEANOUTS

- A. Cleanouts of same diameter as pipe up to 8" in size shall be installed in all horizontal soil and waste lines where indicated and at all points of change in direction. Cleanouts shall be located not less than 18" from building so as to provide sufficient space for rodding. No horizontal run over 100 feet shall be without cleanout whether shown on drawings or not.
- B. All cleanout boxes shall be traffic rated with labeled lid, Christy G05CT or approved equal. Lid shall be vandal proof with stainless steel screws

2.05 UNIONS

- A. Furnish and install one union at each threaded or soldered connection to equipment and 2 unions, one on each side of valves on pipes ½" to 3".
- B. Locate unions so that piping can be easily disconnected for removal of equipment or valve. Provide type specified in following schedule:

Type of Pipe Union

Steel Pipe:	150 lb. Screwed malleable ground joint, brass, brass-to-iron seat, black or galvanized to match pipe.
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PVC Sch 80 pipe:	PVC union, FIPT X FIPT
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2.06 VALVES

- A. Provide valves as shown and other valves necessary to segregate branches or units. Furnish valves suitable for service intended. Valves shall be properly packed and lubricated. Valves shall be non-rising stem. Place unions adjacent to each threaded or sweat fitting valve. Install valves with bonnets vertical. All valves shall be lead free.
- B. Valves ½" thru 2"; shall be made of bronze, full size of pipe and lead free. Nibco S-113-FL Series; American G-300 Series; Matco 511 FL Series; Apollo 102T-FL Series. Brass valves of brass parts within valves will not be accepted.

2.08 SERVICE SADDLES

- A. Shall be used on pipe size 2" thru 4". Body shall be made from ductile iron with epoxy coating or bronze. Cascade Style CSC-1; A.Y. McDonald model 3891 AWWA/3892 FNPT; Smith-Blair #317; Ford S70, S71, S90, (style B).

2.09 TRACER WIRE

- A. No. 10 THW solid copper wire. Solder all joints

PART 3 - EXECUTION**3.01 DRAWINGS AND COORDINATION**

- A. General arrangement and location of piping, etc., are shown on Drawings or herein

specified. Install work in accord therewith, except for minor changes that may be necessary on account of other work or existing conditions. Before excavation, carefully examine other work that may conflict with this work. Install this work in harmony with other craft and at proper time to avoid delay of work.

- B. Verify invert elevations at points of connection to existing systems prior to any excavation. If invert elevations differ from that shown on drawings, notify Architect immediately.
- C. In advance of construction, work out minor changes if conflicts occur with electrical or mechanical. Relocate services to suit actual conditions and work of other trades to avoid conflict therewith. Any adjustments or additional fittings to make adjustments shall not be cause for additional costs to the owner.
- D. Execute any work or apparatus shown on drawings and not mentioned in specifications, or vice versa. Omission from Drawings or Specifications of any minor details of construction, installation, materials, or essential specialties does not relieve Contractor of furnishing same in place complete.
- E. Graded pipes shall take precedence. If conflict should occur while placing the domestic water and fire service piping, the contractor shall provide any and all fittings necessary to route the water lines over or under such conflicting pipes at no additional costs to the owner.

3.02 ACCESS

- A. Continuously check for clearance and accessibility of equipment or materials specified herein to be placed. No allowance of any kind shall be made for negligence on part of Contractor to foresee means of installing his equipment or materials into proper position.

3.03 EXCAVATING AND BACKFILLING

- A. Excavation and Bedding:
 - 1. General: Trench straight and true to line and grade with bottom smooth and free of irregularities or rock points. Trench width to be a minimum of 12" wider than outside diameter of pipe. Follow manufacturer's recommendations for use of each kind and type of pipe.
 - 2. Bedding: Provide a bedding as noted on drawing details for the full length of the pipe. Bedding shall have a minimum thickness beneath the pipe of 4" or 1/8 the outside diameter of the pipe, which ever is greater. Provide bell holes and depressions for pipe joints only of size required to properly make joint.
 - 3. If the trenches for the site utilities falls within areas to be lime treated, the piping shall be installed prior to any lime treatment operations, providing the elevation of the piping is below the treatment section.
 - a. If trenching is necessary in areas that have been previously lime treated the contractor shall backfill the trench with class 2 aggregate base, with minimum section equal to the lime treated section and compacted to 95%.
- B. Laying of Pipe:
 - 1. General: Inspect pipe prior to placing. Sun damaged pipe will be rejected. Set

aside any defective or damaged material. Do not place pipe in water nor place pipe when trenches or weather are unsuitable. Lay pipe bell upgrade, true to line and grade.

- a. Sewer pipe shall be laid in strict conformity to the prescribed line and grade, with grade bars set and each pipe length checked to the grade line. Three consecutive points on the same rate of slope shall be used at all times to detect any variation from a straight grade. In any case of discrepancy, work shall be stopped and the discrepancy immediately reported to the Owner's Representatives. In addition, when requested by the Owner's Representative, a string line shall be used in the bottom of the trench to insure a straight alignment of the sewer pipe between manholes. The maximum deviation from grade shall not be in excess of 1/4 inch. In returning the pipe to grade, no more than 1/4" depression shall result.
- b. The Contractor shall expose the end of existing pipe to be extended, for verification of alignment and elevation, prior to trenching for any pipe which may be affected. All costs of such excavation and backfill shall be included in the price paid for the various items of work.
- c. A temporary plug, mechanical type shall be installed on sewer pipe at the point of connection to existing facilities. If connecting to a public facility the plug shall conform to the requirements of the local jurisdiction. This plug shall remain in place until the completion of the balling and flushing operation.

2. Bell and Spigot Joints: Lubricate inside of bells and outside of spigots with soap solution. Wedge joints tight. Bell of bell and spigot pipe to be pointed upgrade.

C. Backfilling:

1. General: Do not start backfill operations until required testing has been accomplished.
2. Compaction and Grading: Remainder of backfill shall be in accordance with Section 312333 – TRENCHING AND BACKFILLING.
3. If trenching in area previously lime or cement treated backfill top of trench section, same depth as lime or cement treatment with Class 2 Aggregate Base compacted to 95% minimum relative compaction.

3.04 INSTALLATION OF WATER PIPING

- A. Immediately cap or plug ends of, and opening in, pipe and fittings to exclude dirt until final connections made. Use reducing fittings where any change in pipe size occurs. Bushings shall not be used.
- B. General: Should existing conditions or other work prevent the running of pipes or the setting of equipment at the points indicated by drawings, changes as authorized by the Architect shall be made without additional cost to the Owner.
- C. All buried metal shall be incased with 8 mil polyethylene wrap so that no soil is in contact with metal. Ends of polyethylene wrap shall be taped to provide seal with pipe.
- D. Do not install water lines in same trench with non-metallic sewer lines unless bottom of water pipe at all points is at least 12" above top of sewer line and water line is placed on

solid shelf excavated at one side of common trench with a minimum of 12 inch horizontal separation.

- E. Under no circumstance shall a fitting be located directly under a structural footing without prior approval from the Architect.
- F. In locations where existing domestic pipe is rerouted, the new pipe shall be assembled using restrained fittings at all joints including factory pipe joints. Tapped restrained blind flanges shall be temporarily installed at each end of the assembled pipes until testing and chlorination is completed and approved.

3.05 CLOSING IN OF UNINSPECTED WORK

- A. Do not allow or cause work installed to be covered up or enclosed before it has been inspected, tested, and approved. Should work be enclosed or covered up before it has been approved, uncover work at own expense. After it has been inspected, tested and approved, make repairs necessary to restore work of other contractors to condition in which it was found at time of cutting.

3.06 CARE AND CLEANING

- A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in new condition satisfactory to Architect. At completion, carefully clean and adjust equipment, fixtures and trim that are installed as part of this work. Leave systems and equipment in satisfactory new operating condition.
- B. Drain and flush piping to remove grease and foreign matter.
- C. Sewer piping shall be balled and flushed.
- D. Clean out and remove surplus materials and debris resulting from the work, including surplus excavated material.
- E. Flush fire service piping 3 times in the presence of the project inspector. Each flushing shall be 3 minutes minimum.

3.07 SEWER INTERNAL INSPECTIONS

- A. Upon completion of construction and prior to final inspection, the Contractor shall clean the entire new pipeline of all dirt and debris. Any dirt or debris in previously existing pipes or ditches in the area, which resulted from the new installation, shall also be removed. Pipes shall be cleaned by the controlled balling and flushing method. Temporary plugs shall be installed and maintained during cleaning operations at points of connection to existing facilities to prevent water, dirt, and debris from entering the existing facility.

3.08 TEST OF PIPING

- A. Pressure Test piping at completion of roughing-in, in accord with following schedule, and show no loss in pressure or visible leaks after minimum duration or four (4) hours at test pressures indicated.
- B. Chlorination tests shall be performed after all fixtures and any required mechanical devices are installed and the entire system is complete and closed up.

- C. In cases where new domestic water piping is assembled for re-routing of existing domestic water pipe, the contractor shall perform the following testing prior to connecting the new water pipe to the existing system.
1. The pipe shall be pressure tested and per the test schedule.
 2. The pipe shall be pressure tested down within the trench.
 3. The contractor shall dig a temporary ditch below the existing pipe to drain to a sump that is lower than the bottom of the trench and to the side of the trench. The sump shall be 30% larger than the total volume of water within the testing pipe assembly.
 4. After pressure testing and chlorination has taken place and accepted, the contractor shall drain the pipe into the sump and pump the sump out as it is filling.
 5. The temporary test fittings at each end of the pipe assembly shall be removed and the final restrained couplings installed.
 6. The existing piping shall be cut and the water within the pipe shall drain below the pipe to the temporary sump. Pump the sump as it is being filled up. Take extreme caution not to contaminate the existing pipe with any contaminants within the trench.
 7. Before making the final coupling connections, the restrained couplings at each end of the new pipe shall be thoroughly swabbed inside the fitting with a solution of chlorine mixed with water at a rate of 1 part chlorine to 4 parts potable water.
 8. After final connections are made, a visual inspection shall be made after fittings are wiped off. If after 1 hr, no noticeable drips are noted the pipe can be backfilled.
 9. The contractor shall flush all water piping affected by chlorination until it is within acceptable levels approved by certified testing lab.

TEST SCHEDULE

<u>System Tested</u>	<u>Test Pressure PSIG Test With</u>
Private domestic water piping:	150 Lbs. Water 4 hrs.
Sanitary Sewer Piping:	Sewer system shall be tested for leakage per local jurisdiction requirements.

- D. Testing equipment, materials, and labor shall be furnished by contractor.

3.09 WATER SYSTEM STERILIZATION

- A. Public Water Mains: Shall be flushed and disinfected per the local jurisdiction requirements
- B. Clean and disinfect all site water systems connected to the domestic water systems in accordance with AWWA Standard C651 and as required by the local Building and Health Department Codes, and EPA.
 1. Clean and disinfect industrial water system in addition to the domestic water system.

2. Disinfect existing piping systems as required to provide continuous disinfection upstream to existing valves. At Contractors option, valves may be provided to isolate the existing piping system from the new piping system.
- C. Domestic water sterilization shall be performed by a licensed “qualified applicator” as required by CAL-EPA Pesticide Enforcement Branch for disinfecting and sterilizing drinking water.
- D. Disinfecting Agent: Chlorine product that is a registered product with Cal-EPA for use in California potable water lines, such as Bacticide, CAL-EPA Registration No. 37982-20001.
- E. Contractor to provide a 1” service valve connected to the system at a point within 2’-0” of its junction with the water supply line. After sterilization is complete Contractor to provide cap at valve.
- F. Sterilization Procedure to be as follows:
 1. Flush pipe system by opening all outlets and letting water flow through the system until clear water flows from all outlets.
 2. Inject disinfecting agent to provide a minimum chlorine residual concentration of at least 50 parts per million (ppm) of free chlorine at each outlet.
 3. Provide sign at all outlets which reads “Water Sterilization in Progress – Do not operate”. Remove signs at conclusion of test.
 4. Close all outlets and valves, including valve connecting to water supply line and 1” service valve. Retain treated water in pipe for a minimum of twenty-four hours. Should chlorine residual at pipe extremities be less than 50 PPM at this time, pipe shall be re-chlorinated. As an option, the water systems may be filled with a water-chlorine solution containing a minimum of 200 PPM of chlorine and allowed to stand for three hours.
 5. After chlorination, flush lines of chlorinated water and refill from domestic supply. Continue flushing until residual chlorine is less than or equal to 0.2 ppm, or a residual the same as that of the test water.
- G. Chemical and bacteriological tests shall be conducted by a state-certified laboratory and approved by the local authorities having jurisdiction.
- H. Submit written report to Health Department as required by State Regulations. Provide a copy of report to Architect prior to completion of project.
- I. The costs of sterilization and laboratory testing shall be paid for by the contractor.

3.10 CLEANING

- A. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.

END OF SECTION