

## SECTION 15400 - PLUMBING

### PART 1 - GENERAL

#### 1.1 SCOPE

- A. This section covers the furnishing and installation of materials, appliances, fixtures, equipment, and appurtenances associated with the plumbing systems as specified herein and as indicated on the Drawings. Additional requirements for plumbing systems shall be as indicated in the schedules on the Drawings. Suitable connections shall be provided for each fixture, piece of equipment, and appurtenance.
- B. Pipe materials, valves, thermal insulation, and pipe supports which are not an integral part of the fixture or piece of equipment and are not specified herein are covered in other sections.

#### 1.2 GENERAL

- A. Materials furnished and installed under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the Drawings, Specifications, engineering data, instructions, and recommendations of the manufacturer unless exceptions are noted by Engineer.
- B. Coordination
  - 1. Contractor shall verify that each component of the plumbing system is compatible with all other parts of the system; that all piping, fixtures, and appurtenances are appropriate; and that all devices necessary for a properly functioning system have been provided.
  - 2. Where two or more units of the same class of equipment are required, they shall be the product of a single manufacturer; however, all the component parts of the system need not be the products of one manufacturer.
  - 3. Each manufacturer of industrial grade water heaters, shall have a local service center, or with written consent of Engineer, shall be able to provide service from other locations within 24 hours. The service center shall be equipped and staffed to service the system and shall maintain a local parts supply. Information on equipment manufacturers' representatives shall be included with the submittals.
  - 4. Where several manufacturers' names have been listed in this section as possible suppliers, only the products of the first manufacturer listed have been checked for size, functions, and features.
- C. General Equipment Stipulations
  - 1. The General Equipment Stipulations shall apply to all equipment and materials provided under this section. If requirements in this specification differ from those in the General Equipment Stipulations, the requirements specified herein shall take precedence.

D. Seismic Design Requirements

1. Seismic design requirements for products specified herein shall be as indicated in the Meteorological and Seismic Design Criteria section.

E. Governing Standards

1. Except as modified or supplemented herein, all work covered by this section shall be performed in accordance with all applicable municipal codes and ordinances, laws, and regulations. In case of a conflict between this section and any state law or local ordinance, the latter shall govern.
2. All work shall conform to the requirements of AGA, ASTM, NFPA, and UL safety requirements.

F. Power Supply

1. Unless otherwise specified, power supply to equipment with motors shall be as indicated on the Drawings. Power supply for controls shall be 120 volts, 60 Hz, single phase unless otherwise required for a properly operating system.

G. Metal Thickness

1. Metal thicknesses and gages specified herein are minimum requirements. Gages refer to US Standard gage.

H. Mechanical Identification

1. Mechanical identification shall conform to the requirements of the Basic Mechanical Building Systems Materials and Methods section.

1.3 SUBMITTALS

A. Drawings and Data

1. Complete assembly and installation drawings, and wiring and schematic diagrams, together with detailed specifications and data covering materials, parts, devices, and accessories forming a part of the equipment furnished, shall be submitted in accordance with the Submittals Procedures section. Device tag numbers indicated on the Drawings shall be referenced on the wiring and schematic diagrams where applicable. The data and specifications to be submitted for each unit shall include, but shall not be limited to, the following:

Equipment, Piping Accessories, and Appurtenances

Name of manufacturer.

Type and model.

Construction materials, thicknesses, and finishes.

Capacities.

Pressure and temperature ratings.

Overall dimensions.  
Piping connection sizes and locations.  
Net weight.  
Horsepower kW.  
Power requirements.  
Wiring diagrams.

Plumbing Fixtures

Name of manufacturer.  
Type and model.  
Construction materials, thicknesses, and finishes.  
Water consumption data.  
Overall dimensions.  
Rough-in dimensions.  
Piping connection sizes and locations.  
Net weight.

Seismic Design Requirements

Confirmation of compliance with the requirements of the Meteorological and Seismic Design Criteria section.

B. Operations and Maintenance Data and Manuals

1. Adequate operation and maintenance information shall be supplied as required in the Submittals Procedures section. Operation and maintenance manuals shall be submitted in accordance with the Submittals Procedures section.
2. Operation and maintenance manuals are required for electronic trap priming panels, water closets, urinals, faucets and flush valves, emergency fixtures, electric water coolers, water heaters, circulating pumps, expansion tanks, and neutralization tanks .

1.4 QUALITY ASSURANCE

A. Welding Qualifications

1. All welding procedures and welding operators shall be qualified by an independent testing laboratory in accordance with the applicable provisions of AWS Standard Qualification Procedures. All procedure and operator qualifications shall be in written form and subject to Engineer's review. Accurate records of operator and procedure qualifications shall be maintained by Contractor and made available to Engineer upon request.

B. Qualification

1. The plumbing system installer shall be licensed as stipulated by the authority having jurisdiction.

C. Manufacturer's Experience

1. Unless the equipment manufacturer is specifically named in this section, the manufacturer shall have furnished equipment of the type and size specified which has been in successful operation for not less than the past 5 years.

D. Construction

1. Plumbing fixtures shall be constructed in accordance with the following standards:

Enameled Cast Iron	ANSI/ASME A112.19.1M
Vitreous China	ANSI/ASME A112.19.2M
Stainless Steel	ANSI/ASME A112.19.3M
Faucets	ANSI/NSF 61
Emergency/Safety Fixtures	ANSI Z358.1

2. Electric water coolers shall be UL listed and certified in accordance with the Air Conditioning and Refrigeration Institute (ARI) Standard 1010. All materials in contact with water shall comply with the Reduction of Lead in Drinking Water Act. All plumbing fittings and fixtures intended to convey or dispense water for human consumption shall comply with the requirements of NSF/ANSI 61 and NSF/ANSI 372 for lead-free.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Shipping shall be in accordance with the Product Delivery Requirements section. Handling and storage shall be in accordance with the Product Storage and Handling Requirements section.

1.6 EXTRA MATERIALS

- A. Extra materials shall be furnished for each type and size of plumbing fixture or equipment as required, in the quantities indicated below.

<u>Part</u>	<u>Number Required</u>
Flushometer valve repair kits	1 per 5 fixtures
Water closet seats	1 per 10 fixtures
Faucet washer cartridge and O-ring kits	1 per 5 fixtures
Electric water heater elements	1 per heater
Water heater relief valves	1 per heater

- B. Extra materials shall be packaged with labels indicating the contents of each package. Each label shall indicate manufacturer's name, equipment name, part nomenclature, part number, address of nearest distributor, and current list price. Extra materials shall be delivered to Owner as directed.

1. Extra materials subject to deterioration such as ferrous metal items and electrical components shall be properly protected by lubricants or desiccants and encapsulated in hermetically sealed plastic wrapping.

## PART 2 - PRODUCTS

### 2.1 SERVICE CONDITIONS

- A. All plumbing fixtures and equipment shall be designed and selected to meet the specified conditions.

### 2.2 PERFORMANCE AND DESIGN REQUIREMENTS

- A. All fixtures and equipment shall be designed to meet the performance and design conditions specified herein and indicated on the Drawings.
- B. Dimensional Restrictions
  1. Layout dimensions will vary between manufacturers and the layout area indicated on the Drawings is based on typical values. Contractor shall review the contract Drawings, the manufacturer's layout drawings, and installation requirements and shall make any modifications required for proper installation subject to acceptance by Engineer.

### 2.3 ACCEPTABLE MANUFACTURERS

- A. Acceptable manufacturers shall be as listed in the respective product description paragraphs.

### 2.4 MANUFACTURE AND FABRICATION

- A. Anchor Bolts and Expansion Anchors
  1. Anchor bolts, expansion anchors, nuts, and washers shall be as indicated in the Anchorage In Concrete and Masonry section unless otherwise indicated on the Drawings.
- B. Surface Preparation
  1. All iron and steel surfaces, except motors and speed reducers, shall be shop cleaned by sandblasting or equivalent, in strict conformance with the paint manufacturer's recommendations. All mill scale, rust, and contaminants shall be removed before shop primer is applied.
- C. Shop Painting
  1. All steel and iron surfaces shall be protected by suitable coatings applied in the shop. Surfaces which will be inaccessible after assembly shall be protected for the life of the equipment. Coatings shall be suitable for the environment where the equipment is

installed. Exposed surfaces shall be finished, thoroughly cleaned, and filled as necessary to provide a smooth, uniform base for painting. Electric motors, speed reducers, starters, and other self-contained or enclosed components shall be shop primed or finished with an oil-resistant enamel or universal type primer suitable for top coating in the field with a universal primer and aliphatic polyurethane system.

2. Surfaces to be coated after installation shall be prepared for painting as recommended by the paint manufacturer for the intended service, and then shop painted with one or more coats of the specified primer.
3. Surface finish damaged during installation shall be repaired to the satisfaction of Engineer. Field painting shall conform to the requirements of the Protective Coatings section.

#### D. Equipment Bases

1. Unless otherwise indicated or specified, all equipment shall be installed on concrete bases at least 6 inches high. Each unit and its drive assembly shall be supported on a single baseplate of neat design. Baseplates shall have pads for anchoring all components. Baseplates will be anchored to the concrete base with suitable anchor bolts.

#### E. Special Tools and Accessories

1. Equipment requiring periodic repair and adjustment shall be furnished complete with all special tools, instruments, and accessories required for proper maintenance. Equipment requiring special devices for lifting or handling shall be furnished complete with those devices.

#### F. Piping Systems

1. Unless otherwise specified herein, piping system materials shall be as specified in other sections.

#### G. Valves

1. Unless otherwise specified herein, valves indicated to be a part of the plumbing systems shall be as specified in other sections.

### 2.5 WATER SUPPLY PIPING ACCESSORIES

#### A. Water Hammer Arresters

1. Water hammer arresters shall be either bellows or piston type. Bellows type arresters shall consist of a stainless steel shell, a factory charged and sealed compression chamber, a stainless steel or elastomer bellows, and a stainless steel threaded adapter. Piston type arresters shall consist of a seamless Type L copper shell, a seamlessly spun and factory charged air chamber, a factory lubricated double or triple O-ring sealed piston, and a threaded copper adapter. Water hammer arresters shall be tested and certified in accordance with American Society of Sanitary Engineering (ASSE) Standard 1010. Arresters shall be rated for a maximum working pressure of 350 psig and a temperature

range of 33° F to 250° F . Water hammer arresters shall be Smith “Hydrotrol,” Josam “75000 Series Absorbotron,” Wade “Shokstop,” or Sioux Chief “Hydra-Rester.”

B. Trap Primers

1. Electronic Trap Priming Panel

- a. Electronic trap priming panels shall be provided as indicated by the plumbing drawings denoted by a symbol “TPP” and an identifying number. One half-inch copper tubes shall run from the electronic trap priming panel to the traps. Trap primers shall be mounted in accessible locations. Electronic trap priming panels shall consist of a panel, timer, 120 V solenoid, calibrated manifold system and shall be manufactured by Precision Plumbing Products Inc. “PTS Series,” Zurn, MIFAB, or equal. Reference the plumbing drawings for the number of priming tubes required per trap priming panel.

C. Thermostatic Mixing Valves

1. Thermostatic mixing valves shall comply with ASSE 1017, shall be bronze or brass body, with stainless steel flow control components, threaded end connections, rotating handle adjustment, lockable setpoint, and hot and cold check stops. Valves shall be suitable for flow ranges and have temperature adjustment ranges as indicated in the schedules. Temperature adjustment range shall be 85° F to 120° F . Accuracy shall be within 3° F of setpoint. Thermostatic mixing valves shall be manufactured by Symmons, Leonard, or Powers.

D. Vacuum Relief Valves

1. Vacuum relief valves shall have bronze or brass bodies rated for 200 psig and shall be provided with male threaded inlet connections. The valves shall open at 1/2 inch water column vacuum and shall have a venting capacity of at least 15 cubic feet per minute. Vacuum relief valves shall be Watts Regulator “Model LFN36,” Cash Acme “VR-801,” or Apollo Valves “Model VR.”

E. Thermometers

1. Thermometers shall be Weksler Instruments “Adjust Angle,” Ashcroft “Series EI Everyangle” or Weiss Instruments, Inc. “Vari-angle.”
2. Thermometers shall be bimetal type and shall have a dial at least 4-1/2 inch diameter, with black markings on a white background. Pointer travel shall span not less than 200 degrees nor more than 270 degrees. Each thermometer shall have a stainless steel case, bezel, fittings, and stem and shall be hermetically sealed, with external pointer adjustment and an acrylic or shatterproof glass window.
3. Each indicator shall be furnished with an angularly adjustable frame for convenient viewing. Unless otherwise indicated, thermometer range shall be 0 to 200° F .
4. Each thermometer shall be furnished with a stainless steel thermowell for installation in the piping systems. The thermowells shall have 3/4 inch NPT thread mounts, a minimum pressure rating of 250 psig , and a nominal 4 inch insertion length.

F. Strainers

1. Strainers shall be provided where indicated on the Drawings. Strainer screen size shall be 20 mesh unless otherwise indicated. The blowoff from each strainer shall be equipped with a shutoff valve.
2. Strainers located in copper piping systems shall be Y-pattern type with bronze body, threaded ends, and monel or stainless steel screens. Strainers shall be Watts "Series LF777SI," Apollo Valves "Model YB-LF" or Wilkins "Model YBXL."
3. Strainers located in ductile iron piping systems shall be Y-pattern type with iron body, flanged ends, and monel or stainless steel screens. Strainers shall be Hoffman Specialty "Series 400" or Metraflex "Model TF."

G. Hose Faucets

1. Hose faucets shall be constructed with nickel or chrome plated cast brass body, solid brass stem, threaded bonnet, and "T" style handle. Hose faucets shall be provided with a 3/4 inch male pipe thread inlet and a 3/4 inch male hose thread outlet unless otherwise indicated on the Drawings. Hose faucets shall be Prier Brass "Model C-138NP.75," Arrowhead Brass Products, or Zurn.
2. Where indicated on the Drawings, hose faucets shall be equipped with hose connection vacuum breakers. Hose connection vacuum breakers shall be provided with 3/4 inch hose thread ends, brass or bronze bodies, stainless steel stem, rubber seat, and rubber disc. Hose connection vacuum breakers shall be of tamper-resistant design to prevent removal, and shall comply with ASSE Standard 1011 requirements. Hose connection vacuum breakers shall be equipped with manual drain. Hose connection vacuum breakers shall be Febco "Series 731," Watts Regulator Company "Series 8" or Wilkins "Model BFP 8."

H. Wall Hydrants

1. Wall hydrants shall be freezeproof type with bronze body, polished bronze or chrome plated face, integral vacuum breaker, and removable handle key. Wall hydrants shall be provided with 3/4 inch pipe thread inlet and 3/4 inch male hose thread outlet. Wall hydrants shall be ASSE 1019-B approved. Wall hydrants shall be Smith "Model 5619," Zurn "Z1321-C," or Prier "Model C-634."

I. Pressure Gauges

1. Pressure gauges shall be Ashcroft "Duragauge 1279," Weksler, or Weiss Instruments, Inc.
2. Except as modified or supplemented herein, all gauges shall conform to the requirements of ANSI B40.1. Accuracy shall be ANSI Grade A or better. Gauges shall be indicating dial type with C-type phosphor bronze Bourdon tube, stainless steel rotary geared movement, phenolic open-front turret, stainless steel or phenolic ring, case, adjustable pointer, and acrylic or shatterproof glass window.
3. The dial shall be 4-1/2 inch in diameter with black markings on a white background. The units of measurement shall be psi and shall be indicated on the dial face. The pointer shall



span not less than 200 degrees nor more than 270 degrees. The range shall be selected so that the normal operating reading is near the midpoint of the scale.

4. Each gauge shall be provided with a threaded end ball-type shutoff valve as specified in the Ball Valves section.
5. All stem-mounted gauges shall be provided with 1/2 inch NPT connections.
6. Diaphragm Seals
  - a. Pipe-mounted diaphragm seals shall be provided where indicated on the Drawings. Diaphragm seals shall be thread-attached type with cleanout ANSI Type 316 stainless steel diaphragm, plated carbon steel upper housing, and stainless steel lower housing. The diaphragm seal shall be of "continuous" design to safely contain the process fluid in the event of gauge failure or removal from the system under pressure. The lower housing shall be provided with a tapped 1/4 inch NPT flushing connection and an MxF stainless steel needle valve. Each gauge isolator and the gauge served shall be factory assembled, filled with a suitable fluid, and calibrated as a unit.
  - b. Gauge isolators shall be as manufactured by Ashcroft "Type 101," Weksler, or Weiss Instruments, Inc.

## 2.6 DRAINAGE AND VENT PIPING ACCESSORIES

### A. Cleanouts

1. Cleanouts shall be provided where indicated on the Drawings and required by the referenced codes, and shall be of the required type.
2. Floor cleanouts shall consist of a two piece body, a threaded plug, an adjustable head, and a cover. Cleanouts installed in floors that include a waterproofing membrane shall be provided with a flashing flange and membrane clamp. Cleanouts installed in partition walls shall be provided with an access cover and frame with a securing screw installed over the cleanout plug. Wall cleanout covers shall be stainless steel. Cleanouts installed in exposed piping shall consist of a ferrule or threaded adapter and a cast brass or bronze plug installed in a T-pattern, 90 degree drainage fitting.
3. Cast iron cleanouts shall be manufactured by Smith, Josam, or Wade.

### B. Funnel Receptors

1. Funnel receptors shall consist of cast iron funnels with cast iron dome type bottom strainers. Funnel receptors shall be provided with waterstop flange and threaded or no-hub outlet connections suitable for connection to the waste piping. Funnel receptors connected to chemical resistant waste systems shall be furnished with a factory applied chemical resistant interior coating. Unless otherwise indicated, funnel receptors shall be installed 1 inch above the finished floor.
2. Funnel receptors shall be Smith "Series 3800 Figure SQ-3-1793-DBS," Josam, or Wade.

C. Floor Drains

1. Floor drains shall be of the types specified herein and indicated on the Drawings. Floor drains shall have a two-piece body, a flashing collar, an adjustable head, and a grate. A trap primer connection shall be provided when indicated on the Drawings. Floor drains installed in floors that include a waterproofing membrane shall be provided with a flashing flange and membrane clamp.
2. Cast iron floor drains shall be manufactured by Smith, Josam, or Wade.

D. Downspout Nozzles

1. Downspout nozzles shall be cast brass or bronze, and shall be provided with a threaded inlet and a mounting flange. The mounting flange shall be provided with drilled fastening lugs. Downspout nozzles shall be Smith "Model 1770," Josam, or Wade.

E. Floor Sinks

1. Floor sinks shall consist of a cast iron body with acid resistant interior finish, and a nickel-bronze grate. The grate shall be of the type indicated on the Drawings shall be easily removable for cleaning. Floor sink grates and outlets shall be sized as indicated on the Drawings. Floor sinks shall be manufactured by Smith, Josam, or Wade.

F. Vent Flashings

1. Plumbing vent flashings shall be furnished and installed as indicated on the Drawings.

## 2.7 PLUMBING FIXTURES AND ACCESSORIES

A. General

1. Plumbing fixtures shall be provided with all required supports, fasteners, supply and drain fittings, gaskets, and escutcheons required for a complete installation.

B. Water Closets

1. Water closets shall be of vitreous china, with an elongated bowl and siphon jet flushing action. The type and water use of water closets shall be as indicated on the Drawings. All water closets shall be provided with anchor bolt caps. Flush valve type water closets shall be provided with top spud connections for flushometer valves. Water closets shall be manufactured by American Standard, Kohler, or Eljer.
2. Seats
  - a. Water closet seats shall be white, solid plastic, contoured, elongated open front type without cover, with concealed check and stainless steel hinges. The seats shall be manufactured by American Standard, Kohler, Eljer, or Church.

3. Flush Valves

- a. Flush valves. Flush valves for top spud type water closets shall be exposed polished chrome plated type, with a chrome plated brass body as per ASSE1037 with corrosion-resistant components with minimum pressure rating of 125 psig, an externally adjustable diaphragm type, an screw driver angle stop, backflow-prevention device, motorized actuator, automatic sensor with manual push button override a renewable valve seat, a tailpiece, a vacuum breaker, a wall flange, a spud nut and flange, automatic 8 hr courtesy flush, recess mounted sensor box, flush connection and coupling for 1 1/2" inch top spud escutcheons, hardwired operated power converter, hard-wired AC power kit, sensor box cover, vandal resistance screws, low cycle flush cycle set and a 1 inch NPT water supply connection and The actuator shall be suitable for a 120-volt, 60 Hz, single phase power supply. The actuator with Solenoid and hard-wired electronic sensor shall comply with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application. Flush valves shall be Sloan "Royal 111-ESS", Delany Products, Zurn Industries, LLC

4. Supply Set

- a. A supply set consisting of a 1/2 inch NPT brass angle loose key stop valve, a copper supply tube, and an escutcheon plate shall be furnished for each tank type water closet. All supply components shall be polished chrome.

5. Chair Carriers

- a. Wall-mounted water closets shall be provided with adjustable chair carriers. The carriers shall be suitable for the chase depth and piping arrangement and shall consist of a heavy-duty cast iron body, complete with a drainage fitting, pylon feet, a drainage nipple, fitting and fixture gaskets, a positioning frame or template, and mounting hardware. Chair carriers shall be manufactured by Smith, Josam, or Wade.

C. Urinals

1. Urinals shall be of the type and water use as indicated on the Drawings. Urinals shall be of vitreous china, wall mounted, with an elongated rim and washout flushing action, and shall be provided with a top spud connection for a flushometer valve. Urinals shall be manufactured by American Standard, Kohler, or Eljer.

2. Flush Valves

- a. Flush valves shall be exposed type, of polished chrome plated brass as per ASSE1037/ASME 112.19.2/CSA B125.37 with corrosion-resistant components with minimum pressure rating of 125 psig, with an externally adjustable diaphragm, an angle stop, a renewable valve seat, a tailpiece, backflow-prevention, a vacuum breaker, a wall flange, a spud nut and flange, and a 3/4 inch NPT water supply connections. vandal resistant metal cover with hardwired wall mounted sensor right or left -hand supply installation, hard-wired AC power kit, infrared sensor to have adjustment of 12"-28" and electronic manual override button Flush valves shall supply a maximum of 0.125 gallon per flush. The actuator with

solenoid and hard-wired electronic sensor shall comply with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application. Flush valves shall be Sloan "Royal 186-ESS", Delany Products, Zurn Industries, LLC

3. Supports

- a. A fixture support system, including support legs, upper and lower bearing plates, and bearing studs shall be provided for urinals mounted on all walls other than masonry. Urinals mounted on masonry walls shall be provided with suitable anchor bolts. Urinal supports shall be manufactured by Smith, Josam, or Wade.

D. Lavatories

1. Lavatory types, dimensions, and water use shall be as indicated on the Drawings. Lavatories shall be constructed with overflow drains. Wall-mounted lavatories shall be drilled for a concealed arm carrier. Faucet drillings shall be 4 inches on center unless otherwise indicated. Lavatories shall be manufactured by American Standard, Kohler, or Eljer.
2. Faucets and Trim
  - a. Lavatory faucets shall be of polished chrome, 4" trim plate plug adapter power supply, back-check tee, polished chrome finish as per ASSE1037/ASME 112.18.1/CSA B125.1/ NSF/ANSI 61&372 /ANSI A117.1/ with corrosion-resistant components. Faucets shall have a minimum pressure rating of 125 psig, multi-laminar spray, infrared sensor, hardwired-howered, deck-mounted mid body faucet. Each faucet shall be provided with a flow restrictor, a cast brass grid strainer or pop-up drain as indicated on the Drawings, and a 1-1/4 inch cast brass tailpiece. Flow restrictors shall limit water flow as required by the applicable codes and standards. Supply sets consisting of 1/2 inch NPT brass angle loose key stop valves, copper supply tubes, and escutcheon plates shall be furnished for each lavatory faucet. The actuator shall be suitable for a 120-volt, 60 Hz, single phase power supply. The actuator with solenoid and hard-wired electronic sensor shall comply with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application. All supply components shall be polished chrome. Where indicated to be ADA compliant and exposed to human contact, lavatory supplies shall be insulated. Lavatory faucets and supply sets shall be manufactured by American Standard, Kohler, or Eljer.
  - b. Lavatory traps shall be at least 1-1/4 inch in diameter, cast brass with polished chrome finish, with an escutcheon flange and a cleanout plug. Where indicated to be ADA compliant and if exposed to human contact, lavatory traps shall be offset, insulated type.
  - c. When insulation is needed, lavatory supplies and traps may be pre-insulated or furnished with an insulation kit for field installation. Insulating material shall be flame retardant closed cell vinyl. The supply insulating kit shall be snap form type or shall be provided with ties. The trap insulation material shall not require the use of ties or mechanical fasteners to be held in place. Pre-insulated traps and supply

insulation kits shall be McGuire Products “ProWrap.” Trap and supply insulation kits shall be as manufactured by IPS Corporation-Truebro, Plumberex, or Buckaroos, Inc.

3. Supports

- a. Wall-hung lavatories shall be provided with a complete fixture support system, including support legs, bearing plates, concealed arms, and anchor bolts. The support legs shall be mounted within the partition wall. For lavatories mounted on masonry walls, support legs may be omitted. Lavatory supports shall be manufactured by Smith, Josam, or Wade.

E. Janitors Sinks

1. Janitors sink types, dimensions, manufacturers, and models shall be as indicated on the Drawings.
2. Mop sinks shall be floor mounted and constructed of pearl gray terrazzo. Mop sinks shall be provided with an integral 20 gage thick stainless steel threshold cap, a 6 inch drop at threshold, and a shoulder at least 1-1/4 inches wide. A 3 inch cast brass drain and stainless steel strainer, and where indicated, a 20 gage thick stainless steel splash panel shall be provided for each sink. Mop sinks shall be manufactured by Stern-Williams, Fiat, or Florestone Products Company, Inc.
3. Faucets
  - a. Sink faucets shall be rough plated brass, with lever handles, a threaded spout, a vacuum breaker, a wall brace, and a pail hook. The distance from the wall to the center of the spout outlet shall measure approximately 7-1/2 inches. Sink faucets shall be as manufactured by American Standard, Kohler, or Eljer.
4. Drain Assembly
  - a. Mop sinks shall be provided with a 3 inch cast brass drain and a stainless steel strainer. Service sinks shall be provided with a 3 inch cast iron P-type trap standard, with a stainless steel strainer, a cleanout plug, and a threaded outlet.

F. Emergency Fixtures

1. Emergency fixtures, including showers, eye/face washes, and combination shower/eye/face wash units shall be furnished and installed as indicated on the Drawings. Emergency fixtures shall be manufactured by Haws, Guardian, or Encon.
2. Corrosion Resistant Combination Units
  - a. Corrosion resistant combination emergency shower/eye/face wash fixtures shall be pedestal mounted, with 2-1/2 inch schedule 80 PVC stanchion, floor flange, deluge shower, aerated eye/face wash, eye/face wash dust cover, stay-open stainless steel ball valves, interconnecting piping, and universal emergency sign. The shower shall be stainless steel or ABS plastic with stainless steel pull rod actuator. The eye/face wash receptor shall be stainless steel or plastic with push plate actuator.

### 3. Alarm Systems

- a. An audible and visual alarm system shall be provided when indicated on the Drawings. The alarm system shall activate based on water flow when either the emergency shower or eyewash fixture is operated. The alarm system shall provide local, remote, or local and remote alarm indication as indicated on the Drawings. The water flow switch shall be provided with double-pole double-throw contacts rated 5 amperes at 125 volts, suitable for remote alarm annunciation. The audible alarm shall provide an intermittent signal rated at 90 dB at 10 feet. The alarm light shall be amber, flashing type. The alarm system shall be pre-wired and shall be furnished with all necessary junction boxes, conduit, wire, and accessories for a complete installation. The alarm system shall be suitable for a 120 volt power supply.

### 4. Tempered Water Blending Valves

- a. Tempered water blending valves shall be designed specifically for providing tempered water to emergency shower and eyewash fixtures. Each valve shall contain thermostatic elements, integral cold water bypass, and positive hot water shutoff to prevent scalding. Blending valves shall have bronze or brass bodies with threaded inlet and outlet connections and shall be provided with isolation check valves on the hot and cold supplies to the unit. Each unit shall include hot, cold, and blended water temperature gauges and shall be factory set for a blended water temperature of 70° F.
- b. Tempered water blending valves serving eyewash fixtures, a single shower, or a single combination unit shall be suitable for a flow range of 3 to 25 gallons per minute and shall be Haws "Model 9201," Guardian "G3700," or Lawler "Model 911E. Tempered water blending valves serving multiple showers or multiple combination units shall be suitable for a flow range of 3 to 60 gallons per minute and shall be Haws "Model 9202," Guardian "G3900" or Lawler "Model 911."

### G. Electric Water Coolers

1. Electric water cooler type, capacity, manufacturer, and model shall be as indicated on the Drawings. Water coolers shall be wall mounted, mechanically refrigerated type, and shall deliver 50° F water at the specified rate, based on 80° F inlet water temperature and a room temperature of 90° F. The water coolers shall consist of a heavy gage steel cabinet, an insulated cooling tank, a stainless steel receptor, copper water lines, a water pressure regulating valve, an adjustable thermostat, and a 3-wire power cord with a polarized plug. The refrigeration unit shall consist of a hermetically sealed spring mounted compressor and an air-cooled condenser. Electric water coolers shall be suitable for a 120 volt, 60 Hz, single phase power supply, shall be UL and ARI listed, and shall be manufactured by Elkay, Oasis, or Halsey Taylor.

## 2.8 PLUMBING EQUIPMENT

### A. General

1. Plumbing equipment shall be provided with all supports, fasteners, fittings, and escutcheons required for a complete installation.

B. Water Heaters and Accessories

1. Water heaters shall be furnished and installed where indicated on the Drawings. Heater type, storage capacity, recovery rate, energy input, power supply requirements, manufacturer, and model shall be as indicated on the Drawings.
2. Commercial Grade Electric Storage Water Heaters
  - a. Electric storage water heaters shall be commercial type, with a glass-lined tank and one or more heating elements. The heater shall be provided with a cold water inlet tube (top inlet), a magnesium anode, polyurethane foam insulation, a drain valve, and adjustable thermostats. Heating elements shall be sheathed immersion type, low or medium watt density, and shall be field replaceable. Heater tanks shall be ASME stamped for a working pressure of at least 125 psig. Each heater shall be equipped with an ASME rated pressure-temperature relief valve of suitable capacity. Heaters shall be UL and NSF listed, and shall meet ASHRAE Standard 90.1 for energy efficiency. The water heaters shall be manufactured by State Industries Inc., A. O. Smith, or Lockinvar.
3. Circulating Pump
  - a. A circulating pump shall be furnished and installed where indicated on the Drawings. Pump capacity, power requirements, manufacturer, and model shall be as indicated on the Drawings.
  - b. The circulating pump shall be an in-line unit with a bronze body, bronze fitted, mechanical seals, a stainless steel or ceramic shaft, and at least 1/2 inch NPT connections. The circulating pump shall be controlled by a 7-day time clock provided with the pump. Initial time clock setting shall energize the pump at 6:00 am and de-energize the pump at 6:00 pm each day. The time clock shall be suitable for a 120 volt single phase power supply, and shall have contacts rated for 10 amperes ac. The circulating pump shall be manufactured by Bell & Gossett, Thrush, or Taco.

C. Neutralization Tanks

1. Neutralization tank volume, connection sizes, manufacturer, and model shall be as indicated on the Drawings.
2. Neutralization tanks shall be of heavy-duty construction, rotomolded in one piece from polyethylene resins. Inlet, outlet, and vent fittings molded from the same resins as the tank shall be triple-welded to the tank body at the locations indicated on the Drawings. A full diameter extension constructed of the same material as the tank shall be provided where required to raise the access cover to at or just below the floor level as indicated on the Drawings. When indicated on the Drawings, the tank shall be provided with a minimum 17 inch bolted manway cover. The cover shall be provided with a 6 inch cleanout plug and stainless steel fasteners. The tank shall be filled with hard limestone or marble chunks, 2 to 3 inches in diameter to the level recommended by the manufacturer.

Neutralization tanks shall be manufactured by Orion ,Enfield or Town & Country Plastic, Inc.

D. Hoses

1. Hose type, diameter, manufacturer, and model shall be as indicated on the Drawings.
2. Unless otherwise indicated, each hose shall be provided with one male swivel type brass hose connector, one female brass hose connector, and one regulating wash-up spray nozzle. Spray nozzles in 1 inch and 1-1/2 inch sizes shall be Potter-Roemer Inc. "Series 2970" with a cast brass body, a rubber bumper, and a female hose thread.
3. Type 2 Hoses
  - a. Type 2 hoses shall be non-collapsible, suitable for water service and shall be rated for 150 psig working pressure. The hose shall consist of 3/4 inch ID heavy-duty ethylene, propylene diene (EPDM) rubber tubing with synthetic, high tensile textile cord reinforcement and an EPDM cover. Type 2 hoses shall be Gates Rubber Company "Adapta Flex" or Potter-Roemer "Model 2851."

E. Expansion Tanks

1. Expansion tank capacities, connections, manufacturer, and model shall be as indicated on the Drawings.
2. Expansion tanks shall be welded steel diaphragm type, ASME tested and stamped for a working pressure of 125 psig, with a flexible diaphragm and a charging valve. Floor-mounted tanks shall be provided with a suitable mounting base. The tanks shall be suitable for use with potable water and shall be factory pre-charged to the indicated pressure. Expansion tanks shall be manufactured by Amtrol, State Industries Inc., or Watts.

2.9 COLOR

- A. Vitreous china, cast iron, enameled steel, and composite plumbing fixtures shall be white unless otherwise indicated. Other plumbing fixtures shall be the manufacturer's standard color. Plumbing equipment shall have the manufacturer's standard color and finish unless otherwise indicated in the schedules.

2.10 ELECTRICAL

- A. Electrical controls and disconnects shall be furnished and installed under the Electrical section, except where specified herein. All electrical controls shall have enclosures suitable for the environment and NEMA rating as indicated on the electrical Drawings.



## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Equipment installed in existing facilities with limited access shall be suitable for being installed through available openings. Contractor shall field verify existing opening dimensions and other provisions for installation prior to submittal of bids.

### 3.2 PREPARATION

#### A. Surface Preparation

- 1. All surfaces to be field painted shall be dry and free of dirt, dust, sand, grit mud, oil, grease, rust, loose mill scale, or other objectionable substances, and shall meet the recommendations of the paint manufacturer for surface preparation. Cleaning and painting operations shall be performed in a manner which will prevent dust or other contaminants from getting on freshly painted surfaces. Oil and grease shall be completely removed by use of solvents or detergents before mechanical cleaning is started. The gloss of previously painted surfaces shall be dulled if necessary for proper adhesion of top coats.

### 3.3 INSTALLATION

- A. Materials furnished under this section shall be installed in proper operating condition in full conformity with the drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.
- B. Unless otherwise indicated, sleeves shall be provided for all pipe penetrations through concrete and masonry walls. Sleeves and sealing requirements shall be as indicated in the Miscellaneous Piping and Accessories Installation section and as indicated on the Drawings.
- C. Not all required reducing fittings and unions are indicated. Additional fittings and unions shall be provided as needed to connect all equipment and appurtenances.
- D. Insulating fittings shall be provided to prevent the contact of dissimilar metals in piping systems.
- E. When located indoors, fuel gas pressure regulator vents and fuel train vent valves shall be piped to the exterior of the building in accordance with the applicable codes and standards.
- F. Piping shall not be routed over or in front of electrical switchboards or panels unless acceptable to Engineer.
- G. Water Supply Piping and Accessories
  - 1. Water hammer arresters shall be provided in the hot and cold water supply piping at all quick closing valves, at solenoid valves, and at plumbing fixtures. When not indicated on the Drawings, arresters shall be located and sized by Contractor in accordance with PDI

Standard No. WH201. Contractor shall submit arrester location and sizing plans to Engineer for approval prior to installation. Where possible, water hammer arresters shall be installed in an accessible location.

2. Water supply piping to hose faucets and hose valves shall be secured with a pipe support within 6 inches of the fixture.
3. Scald protection valves shall be installed per manufacturer's recommendation, adjacent to the actuation valve for each emergency shower and the eye/face wash where indicated in the schedules. Drain piping from valves shall be secured to adjacent unit support and routed to nearest funnel receptor and discharge with an air gap.

#### H. Drainage and Vent Piping and Accessories

1. Unless otherwise indicated or required by code, horizontal sanitary drainage piping 3 inches in diameter or smaller shall be installed at a uniform slope of 1/4 inch per foot ; horizontal sanitary drainage piping larger than 3 inches in diameter shall be installed at a uniform slope of 1/8 inch per foot ; horizontal storm drainage piping shall be installed at a uniform slope of 1/8 inch per foot .
2. All cast iron drainage piping which is buried beneath floors shall be encased in at least 6 inches of concrete. A joint shall be provided in the piping within 12 inches of each end of the encasement. For buildings supported by piers or piles, the concrete encasement shall be reinforced and connected to the floor slab.
3. Drainage fittings shall be installed to convey flow in the piping in the intended direction. To the extent possible, changes in direction shall be made by sweep type fittings. Quarter-bends and sanitary tee fittings shall not be installed for vertical to horizontal or horizontal to horizontal changes of direction.
4. Plumbing vents through roofs shall be located at least 12 inches from a parapet or from the intersection of a cant with the roof deck, and shall be installed with watertight flashings. Plumbing vents shall be located no closer to operable windows or air intakes than is allowed by the applicable code.
5. Vents connecting to horizontal sanitary piping shall connect above the centerline of the piping and shall rise at an angle of not less than 45 degrees from the horizontal to a point at least 6 inches above the flood level rim of the fixture served before offsetting horizontally.
6. Floor drains shall be adjusted to the correct elevation for proper drainage. Heads of fastening screws shall be flush with the grate surface.
7. Cleanouts on drainage piping inside structures shall be located where indicated on the Drawings. Additional cleanouts shall be provided where required by the applicable code or authority having jurisdiction. Cleanouts located in drainage risers shall be located 12 inches above the finished floor.
8. Unless otherwise indicated or required by the applicable code, cleanout size shall equal the line size for 4 inch and smaller drainage piping, and 4 inch in diameter for drains

larger than 4 inch . Proper clearance shall be provided for access to cleanouts. Floor cleanouts shall be installed flush with the finished floor.

9. Floor drains, trench drains, floor sinks, funnel receptors, and bell-up drains indicated to be equipped with traps shall be provided with deep seal “P” traps located as close to the drain as possible.
10. Roof drains shall be set at the proper level for flashing and drainage and shall be securely attached to the roof decks to prevent movement, unless otherwise indicated. Overflow roof drain dams or standpipes shall be set at an elevation 2 inches above the low point of the roof.

#### I. Plumbing Fixtures and Accessories

1. Plumbing fixtures shall be set level and plumb, and shall be securely attached to the floor or wall. Unless otherwise indicated on the Drawings, each fixture shall be mounted at the height recommended by the manufacturer. Where required to be in compliance with ADA, fixtures shall be mounted at the heights established by the Federal Government.
2. Fixtures shall be sealed to the floor or wall with a sealant as specified in the Joint Sealants section. The color of sealant shall match the color of the fixture.
3. Fixture traps shall be easily removable for servicing and cleaning. Escutcheons shall be placed at all locations where fixture supply or drain piping penetrates walls, floors, or ceilings.
4. Water piping at stop valves, shower heads, and flush valves shall be rigidly secured to blocking. Drop-ear elbows shall be used whenever possible. All water supply piping shall be cleaned and flushed before the plumbing fixtures are installed.
5. Shutoff valves located in the tempered water (TW) supply piping to safety fixtures and shutoff valves in the potable water branch piping to the TW system shall be provided with tags bearing the legend “WARNING: DO NOT CLOSE VALVE WITHOUT AUTHORIZATION.” The tags shall have an orange background and black lettering not less than 1/2 inch in height. Other features of the tags shall be as indicated in the Mechanical Identification paragraph.

#### J. Plumbing Equipment

1. Plumbing equipment shall be installed in accordance with the manufacturer’s recommendations. Adequate clearance shall be provided for access to all components which may require adjustment, servicing, or replacement.
2. Water heaters shall be installed in accordance with AGA, NSF, NFPA, and UL requirements. Storage type water heaters shall be cleaned and flushed before being connected to the potable water system. Water heater relief valves shall be piped to the nearest drain or as indicated on the Drawings, and shall terminate the appropriate air gap distance above the drain. Unless otherwise indicated, water heater thermostats shall be set such that the maximum water temperature does not exceed 140° F .

### 3.4 FIELD QUALITY CONTROL

#### A. Installation Check

1. An installation check by an authorized representative of the manufacturer of equipment specified herein is not required.
2. An experienced, competent, and authorized representative of the manufacturer for industrial grade water heaters, shall visit the site of the Work and inspect, check, adjust if necessary, and approve the equipment installation. The representative shall be present when the equipment is placed in operation in accordance with the Startup Requirements section, and shall revisit the jobsite as often as necessary until all trouble is corrected and the equipment installation and operation are satisfactory in the opinion of Engineer.
3. The manufacturer's representative shall furnish a written report certifying that the equipment has been properly installed and lubricated; is in accurate alignment; is free from any undue stress imposed by connecting piping or anchor bolts; and has been operated under full load conditions and that it operated satisfactorily.
4. All costs for these services shall be included in the Contract Price.

#### B. Startup and Testing

1. Field performance tests shall be conducted to demonstrate that each system is functioning as specified and to the satisfaction of Engineer.
2. If inspection or tests indicate defects, the defective work or material shall be replaced, and inspection and tests repeated. All repairs to piping shall be made with new materials. Caulking of threaded joints or holes will not be acceptable.

### 3.5 ADJUSTING

- #### A.
- All devices shall be adjusted for proper flow and quiet operation. Faucet and supply assemblies shall be adjusted or repaired to eliminate leaks. All drains shall be checked for proper operation.

### 3.6 PROTECTION

- #### A.
- Plumbing fixtures, equipment and appurtenances shall be protected from damage immediately after installation.

### 3.7 CLEANING

- #### A.
- After completion of testing and immediately before the final inspection, plumbing fixtures, equipment, piping, and appurtenances shall be thoroughly cleaned. Cleaning materials and methods shall be as recommended by the manufacturer. All faucet aerators shall be removed, cleaned, and reinserted.

- B. Any stoppage, discoloration, or other damage to parts of the building, its finish, or furnishings shall be repaired at no additional cost to Owner.

### 3.8 DISINFECTION

- A. Before the potable water system is placed in operation, it shall be disinfected in accordance with the requirements of the local authority having jurisdiction. In the absence of local requirements, the following disinfection method shall be used:
  1. The system shall be purged with clean potable water until all dirt and other substances are flushed from the system.
  2. The system shall be filled with a water/chlorine solution containing at least 50 parts per million of available chlorine and allowed to stand for 24 hours; or the system shall be filled with a water/chlorine solution containing at least 200 parts per million of available chlorine and allowed to stand for 3 hours.
  3. The system shall be purged with clean potable water until the chlorine is flushed from the system.
  4. The procedure shall be repeated if a bacterial examination indicates that contamination remains present in the system.

End of Section