SECTION 15400 - PLUMBING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The drawings and the specifications including Section 15000 “Supplemental General Mechanical Conditions” are hereby made a part of the work of this section.

1.02 DESCRIPTION

A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections, and incidentals and the performing of operations required to provide a complete and functional plumbing system.

B. Work shall be in accordance with the current edition of the BOCA International Plumbing Code and applicable local ordinances.

1.03 SUBMITTALS

A. Substitutions: Your attention is directed to Section 15000-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section shall be achieved before reading the PRODUCTS section of this specification.

B. The items for which the submittals paragraph in Section 15000, Supplemental General Mechanical Requirements, apply are as follows:

1. Piping materials.
2. Valves.
3. Pipe hangers.
4. Fixtures and trim.
5. Miscellaneous equipment.
6. Water heating equipment.
7. Piping, valves and equipment identification.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

A. Soil and Waste (Sanitary) and Vent Piping: Cast iron with push-on joints below grade. Cast iron "no Hub" above grade. Sanitary piping below grade and vent piping above grade may be PVC at contractor's option, cast iron (ONLY) thru roof.

B. Domestic Water Piping (Above Grade): Type L hard copper tubing and cast bronze or wrought copper solder fittings.

C. Exposed Water and Waste Piping at Fixtures: I.P.S. copper with cast brass fittings chrome plated finish, with deep one piece escutcheon plates at traverse points.

D. Solder: Lead-free (ONLY), Englehard Silvabrite 100, 440°F melting point, ASTM B32.

E. Underground Cold Water Piping (Building Entrance): ASTM D2737 black polyethylene tubing, 200 psi rated with brass or bronze adapters complete with stainless steel clamps.

2.02 GAS PIPING SYSTEM

A. Gas Piping: Schedule 40 carbon steel pipe conforming to ASTM 120 or A53, with threaded joints and malleable iron fittings (Above grade).

B. Ball Valves for Gas Service: Copper alloy with chromium plated floating ball per Federal Specification WW-V-35B, Type II, Class 3. Blowout-proof stem, reinforced teflon seats, threaded ends, quarter turn on-off, 600 WOG rating, 250 psi rating for natural gas, UL-listed as an natural gas shutoff valve, Apollo Model 80-100 series.

2.03 VALVES

A. Ball Valves: Copper alloy with stationary seat ring and chromium plated or stainless steel floating ball per Federal Specification WW-V-35B. Blowout proof stem, reinforced PTFE seal. Sizes 2" and larger shall have threaded ends. Provide lever handle with stem extension as required to allow operation without interfering with pipe insulation.

B. Check Valves: Horizontal Swing, MSS SP-80, Type 3, Class 125.

C. Drain Valves: Provide ball valves with 3/4" hose connection and brass cap.

D. Fixture Service Stop Valves: Angle Wheel Handle Stop, ASME A112.18M.

1. Each plumbing fixture shall have individual stop valves in the hot and cold supplies.

2. Service stop valves exposed in finished areas shall be chrome-plated brass; in non-finished areas, ball valves shall be used in lieu of chromed supplies.

E. Temperature and Pressure Relief Valves: Bronze body, tested under ANSI Z21.22, AGA and ASME rated, 125 psig/210°F relief settings.

F. Balancing Valves: Taco Circuit Setter.

1. Bronze or brass body and internals, teflon seats, memory stop, 175 psi working pressure, 250°F working temperature. Balancing devices shall have provisions for connecting a portable differential pressure gauge. Each balancing device shall be sized to provide a differential pressure reading between 2 and 5 feet with the valve full open at design flow rates.

2. Install per manufacturer's recommendations for adjacent length of straight pipe.

3. Submittals shall indicate gpm, size, wide open differential pressure meter reading, and actual water pressure drop.

G. Pressure Reducing Valves: Watts Regulator series U5LP bronze body, bronze internals, 200 psi working pressure, 200°F maximum temperature, adjustable pressure range 10-25 psig. Provide with inlet strainer (screen).

2.04 PIPE HANGERS

A. Adjustable Swivel Hangers:

1. Pipe sizes 2" and less: Carpenter and Paterson Fig. 800, oversize for insulated piping systems.

2. Pipe sizes larger than 2": Carpenter and Paterson Fig. 100, oversize for insulated piping systems.

B. Riser Clamp: Carpenter and Paterson Fig. 126 CT copper plated for copper piping, Fig. 126 for iron and PVC piping.

C. Insulation Shields: 18 ga. galvanized steel, 180° wrap, Carpenter and Paterson Fig. 265P, Type H.

D. All piping 20' upstream and downstream of pumps shall also have Mason Industries PC30N precompressed double deflection spring isolators installed.

2.05 FIXTURES AND TRIM

A. (P-1) ADA Water Closet: Floor-mounted, pressure-assist tank type, Eljer Aqua-Saver 17", 16-3/4"H, elongated bowl, white vitreous china, low consumption (1.6 gpf). Trip lever shall be mounted on the wide side of the stall.

1. Seat: Church Model 380TC, residential heavy weight solid plastic, closed front with cover, stainless steel hinges, for elongated bowl, white color.

2. Total installed height of front edge of seat shall be 17" to 19" above finished floor. Final installation shall meet ADA guidelines and ANSI A117.1.

B. (P-2) ADA Lavatory, Wall Hung: Eljer Blair, 19"x17", white vitreous china, faucet holes on 4" centers, front edge shall extend minimum of 17" from rear finished wall.

1. Faucet: Symmons Symmetrix Model S-20-2-FR wrist operation handle, 0.5 GPM flow aerator, polished chrome finish, ceramic control cartridge, single lever.

2. Drain: Pop-up drain assembly with bright metal finish.

3. Carrier: Zurn or Jay R. Smith with concealed arms and rectangular steel uprights for floor mounting.

4. Trap: Chrome-plated, cast copper alloy, 1-1/4" P-trap with cleanout plug. Adjustable with connected elbow and nipple to wall. Insulate trap and supplies with McGuire ProWrap or Truebro Model 102 insulation kit with PVC cover where architectural shield is not provided.

5. Lavatory shall be installed at 34" above finished floor. Final installation of lavatory and accessories shall meet ADA guidelines and ANSI A117.1.

C. (P-3) Shower: Aquarius Bathware Model G-3698-BF, “no-recess necessary” (3/4”) threshold, gelcoat one-piece, 39”Lx39.5”Wx78.5”H overall dimensions, open top, 1.5” diameter L-shaped stainless steel grab bar, 1” stainless steel curtain rod, weighted flame retardant anti-bacterial curtain with hooks, suitable for future installation of fold up seat.

1. Shower Unit: Symmons Temptrol 2000 packaged unit. Pressure balancing mixing valve with lever handle, adjustable stop screw, wall/hand shower (2.5 GPM), flexible metal hose, and 30" slide bar for hand shower mounting.

D. (P-3A) Shower, Barrier-Free: Aquarius Bathware Model G-3698-BF, ADA compliant, “no-recess necessary” (3/4”) threshold, gelcoat one-piece, 39”Lx39.5”Wx78.5”H overall dimensions, open top, 1.5” diameter L-shaped stainless steel grab bar, 1” stainless steel curtain rod, weighted flame retardant anti-bacterial curtain with hooks, fold up seat.

1. Shower Unit: Symmons Temptrol 2000 packaged unit. Pressure balancing mixing valve with lever handle, adjustable stop screw, wall/hand shower (2.5 GPM), flexible metal hose, and 30" slide bar for hand shower mounting.

2. Installation of shower and accessories shall meet ADA guidelines and ANSI A117.1.

E. (P-4) Kitchen Sink, Single Bowl: Elkay LRAD1720 stainless steel, 17"x20" overall size, 4 faucet holes on 4" centers, fully sound deadened.

1. Faucet: Symmons Symmetrix Model S-23-2-10 wrist operation handle, 10-7/8" swing spout, polished chrome finish, ceramic control cartridge, single lever, side spray.

2. Strainer: Dayton Model D-1125 with removable basket and neoprene stopper.

F. (P-4A) ADA Kitchen Sink, Single Bowl: Elkay LRAD2521 stainless steel, 25"x21.25" overall size, 4 faucet holes on 4" centers, fully sound deadened. Drain shall be located in upper left or right corner of bowl.

1. Faucet: Symmons Symmetrix Model S-23-2-10 wrist operation handle, 10-7/8" swing spout, polished chrome finish, ceramic control cartridge, single lever, side spray.

2. Strainer: Dayton Model D-1125 with removable basket and neoprene stopper. Insulate trap and supplies with McGuire ProWrap or Truebro Model 102 insulation kit with PVC cover where architectural shield is not provided.

3. Sink installation shall be in compliance with the ADA guidelines.

G. (P-5) Washing Machine Supply and Drain: In-wall, concealed type, Symmons Laundry-Mate, 2" drain, single shutoff valve to provide simultaneous control of hot and cold water.

H. (P-6) Mop Basin: Fiat Model MSB-2424, molded stone, 24"x24"x10" with 1" wide shoulders; 3" stainless steel drain with combination dome strainer and lint basket.

1. Faucet: Fiat Service Faucet Model 830-AA, chrome-plated with vacuum breaker, integral stops, adjustable wall brace, pail hook, and 3/4" hose thread on spout.

2. Hose and Hose Bracket: Fiat Model 832-AA, 30" long flexible heavy duty 5/8" cloth reinforced rubber hose with 3/4" chrome coupling at one end, 5"x3", stainless steel bracket with rubber grip.

3. Wall Guard: Fiat Model MSG-2424, stainless steel wall guards.

4. Mop Bracket: Fiat Model 889-CC, 24" stainless steel.

5. Caulk around mop basin at floor and walls with white silicone caulk.

2.05 MISCELLANEOUS EQUIPMENT

A. Floor Drain (FD-1): Zurn Z-415, cast iron body with 2" or 3" bottom outlet, combination invertible membrane clamp and adjustable collar.

1. Strainer: 6"diameter Zurn "Type B", polished nickel-bronze.

B. Floor/Yard Cleanout (FCO/YCO): Zurn Z-1400 adjustable floor cleanout, cast iron body, with gas and watertight ABS tapered thread plug. Provide size equal to piping served with maximum size of 4".

1. Concrete floor finishes: Scoriated round polished bronze top.

2. Sheet tile finishes: Scoriated square polished bronze top recessed to receive tile.

3. Carpeted finishes: Scoriated round polished bronze top and carpet marker.

C. Wall Cleanout (WCO): Sanitary tee with threaded raised nut or countersunk-nut cleanout plug located behind Zurn Z-1468 round stainless steel wall access cover.

D. Vacuum Breaker: Watts Model N36, 3/4" size, 20 CFM capacity.

E. Strainer: Watts Series 777, MIL-S-16293, bronze body wye-type, 200 WOG rating, screwed end connections, 20 mesh stainless steel, monel, or bronze screen.

F. Backflow Preventor (BFP): Conforming to AWWA C506, FCCHR-USC Manual Section 10, and UL listed. Types, sizes and capacities scheduled.

1. Double Check (DC): Double check backflow assembly with test ports, bronze body with stainless steel springs, corrosion resistant internals, stop and waste ball valves.

2. Atmospheric Double Check (DCA): Double check continuous pressure type with atmospheric port for low hazard applications, 250°F maximum water temperature, bronze body, stainless steel internals with rubber seals and integral strainer.

C. Reduced Pressure Zone (RPZ): Reduced pressure principle type; bronze body with stainless steel internals. Provide bronze body ball valves, test cocks, and air gap fittings.

G. Freezeless Wall Hydrant: Woodford Model 65, 3/4" size, brass body, brass head nut, automatic draining, with loose tee key and vacuum breaker.

H. Thermometers: Trerice Series V80445 or Ashcroft Series 600A-04, vapor actuated, adjustable angle, 4-1/2" diameter face, cast aluminum case, stainless steel ring, glass window, white background dial with black figures, black finished stainless steel pointer, brass movement with bronze bearings, phosphor bronze bourdon tube. Accuracy shall be to within one scale division.

1. Thermowell: Provide with brass thermometer wells projecting a minimum of 2" into the pipe with extension to face of insulation. Provide with heat transfer fluid to fill interstitial space between bulb and well.

2. Range: 30°F to 240°F for domestic hot water systems.

I. Pressure Gauges: Trerice Series 800 or Ashcroft Type 1005, Grade B, 3-1/2" dial, ANSI B40.1, drawn steel case, white background dial with black figures, clear glass window, brass movement, beryllium copper bourdon tube, 0 to 100 PSI range, accuracy shall be within 2% over middle half of scale and 3% over the remainder. Provide with shut off petcock and restrictor.

J. Circulator (inline)(CP): Taco model indicated, pumps shall be inline cartridge-type or close coupled pump of capacity and performance indicated with all bronze construction 125 psig rated working pressure, 200°F maximum water temperature, carbon Ni-resist mechanical

seal, flexible coupling, resilient-mount drip-proof sleeve bearing motor. The pumps shall be factory tested, cleaned and painted with machinery enamel. A set of installation instructions shall be included with pump. Provide high efficiency motors if available as an option of the manufacturer. If high efficiency motors are not available as an option of the manufacturer, submit a certification stating same.

K. Water Hammer Arrestor (Shock Absorber): Plumbing and Drainage Institute listed.

Schedule:

"A" - Size #100 PDI - 0-11 Fixture Units
"B" - Size #200 PDI - 12-32 Fixture Units
"C" - Size #300 PDI - 33-60 Fixture Units

L. Trap Primer: Zurn Z-1022 Automatic Trap Primer, all bronze body with integral vacuum breaker, non-liming internal operating assembly with gasketed bronze cover.

M. Vacuum Breaker: Watts Model N36, 3/4" size, 20 CFM capacity.

N. Strainer: Watts Series 777, MIL-S-16293, bronze body wye-type, 200 WOG rating, screwed end connections, 20 mesh stainless steel, monel, or bronze screen.

O. Elevator Pit Drainage System: Stancor, Inc., Model SE50 “Oil-Minder System”, or approved equal, ½ HP., 3600 RPM, 120V. , 2" discharge with float switch. A NEMA 4X control panel and a self-cleaning, hermetically sealed, stainless steel oil sensing probe shall alarm if oil is sensed. The pump shall be submersible with discharge check valve. The equipment shall be UL-listed.

P. Roof Drain (RD-1): Zurn Z-100, 15" Diameter, 4" outlet, cast iron body with combination membrane flashing clamp/gravel guard and low silhouette cast iron dome. Provide with roof sump receiver, underdeck clamp, static extension as required, and line size vertical expansion joint as required due to inflexibility of drainage piping.

2.06 WATER HEATING EQUIPMENT (WH-1)

A. Gas-Fired Water Heater (WH-1): PVI, Bock, Reco, AO Smith, State Industries or approved equal packaged unit of make, model, and performance as scheduled on Drawings; UL 732 and ASHRAE 90A (1982 requirements) compliant, ASME construction, designed to burn propane / natural gas, glass-lined or other approved lined tank with replaceable magnesium anode rods and heavy gauge steel jacket with baked enamel finish, factory installed ASME rated temperature and pressure relief valve, dial thermometer and pressure gauges and adjustable range thermostat. Set to provide 160^{o}F water temperature. Hot and cold water connections shall be 1-1/2".

1. Burner: power burner, solid state flame safeguard with direct spark ignition, main and pilot gas valves, gas pressure regulator, diaphragm air switch for proof of blower

operation, electronic low-water cut-off, and separate high temperature limit control. Furnish with draft regulator.

2. The water heater shall have a three (3) year free replacement warranty in commercial service for labor and materials.

3. Installation and start-up shall be in accordance with the manufacturer's recommendations.

2.07 PIPING, VALVE, AND EQUIPMENT IDENTIFICATION

A. Piping identification: Provide plastic "wrap-around" identification markers indicating flow and fluid flowing for the following:

1. Domestic Hot Water
2. Recirculated Domestic Hot Water
3. Domestic Cold Water
4. Vent Piping
5. Exposed Above-ground Sanitary Drain Piping
6. Gas Piping

B. Markers shall be placed 30-50 ft. apart for piping in accessible areas.

C. Markers shall be placed outside the pipe insulation and in the most obvious location for viewing.

D. Valve Tags:

1. Attach to each valve a 1-1/2" round or octagonal brass tag with 1/2" indented numerals filled with a durable black compound. In addition to the valve numbers, each tag shall identify the system it controls. Service stop valves exposed in finished areas need not be tagged.

2. Tags shall be securely attached to stems of valves with copper or brass "S" hooks, or chains.

3. Valve charts shall be provided for each piping system and shall consist of schematic drawings of piping layouts, showing and identifying each valve and describing its function. Upon completion of the work, one (1) copy of each chart, sealed to rigid backboard with clear lacquer placed under glass and framed, shall be hung where directed. Two (2) additional unmounted copies shall be delivered to the Architect.

4. Tags and charts shall be coordinated with Section 15700 Heating System and when completed this work shall have been done sequentially.

E. Equipment Identification: Provide laminated plastic nameplates for equipment, pumps, mixing valves, backflow preventers, and balancing valves. Nameplates shall be laminated 0.125-inch thick melamine plastic conforming to Fed. Spec. L-P-387, black with white center core. Surface shall be a matte finish, corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be minimum of 0.25-inch high normal block lettering.

2.08 DUPLEX PUMP STATION

A. Shall be Goulds or approved equal. The basin shall be Duplex Model A7-3602, 36" diameter, fiberglass with size and number of tappings as indicated or required.

B. The steel basin cover shall be Duplex Model A8-3633D, 40" diameter with gasket, access panel and flanged pipe connections.

C. The pumps shall be Model 3887, Order Number WS0511BF, submersible solids handling sewage pump, 1/2 Hp, 120v., 60 Hz., 13.0 amps, with 2" maximum solids handling capacity, rated at 40 gpm at a twenty (20) foot total dynamic head, 2" discharge.

D. The controller shall be SES series custom control panel, UL-listed with NEMA 1 enclosure, duplex controller with automatic alternator and high level alarm. The controller shall include float-type level switches, audible and visual alarm indication, relays and switches.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection:

1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.

2. Verify that plumbing may be installed in strict accordance with pertinent codes and regulations and the reviewed Shop Drawings.

3.02 INSTALLATION OF PIPING

A. Provide and erect in accordance with the best practice of the trade piping shown on the drawings and as required to complete the intended installation. Make offsets as shown or required to place piping in proper position to avoid other work and to allow the application of insulation and finish painting to the satisfaction of the Architect.

B. The size and general arrangements, as well as the methods of connecting piping, valves, and equipment, shall be as indicated, or so as to meet the requirements of the Architect.

C. Piping shall be erected so as to provide for the easy and noiseless passage of fluids under working conditions.

D. Install unions to facilitate removal of equipment.

E. Copper pipe shall be reamed to remove burrs.

F. Connections between copper and steel piping shall be made with brass fittings.

G. Solder joints shall be made with lead free solder. Clean surfaces to be soldered and use a paste flux. Wash joints with sodium bicarbonate and water to remove corrosive effects of heated solder paste. Caution: Lead-bearing solder is not permitted.

H. Pipe penetrations through walls, floors and ceilings shall be in accordance with Section 15000 "Supplemental General Mechanical Requirements". Traverse points of piping shall be escutcheoned with split chrome floor and ceiling plates and spring anchors, where visible to occupancy.

I. Provide a cleanout in the vertical position at the base of each sanitary and roof drain drop.

J. Sanitary, roof drain and vent piping shall be sized and installed at 1/4" per foot slope or as indicated and in no case less than 1/8" per foot.

3.03 PIPE HANGERS

A. Impact driven studs are prohibited.

B. Copper Tubing: supported at intervals with rod sizes as follows, double nuts on hangers and on beam clips.

Copper Size	Hanger Intervals	Rod Sizes
1/2"	5'	3/8"
3/4"	6'	3/8"
1"	6'	3/8"
1-1/4"	8'	3/8"
1-1/2"	8'	3/8"
2"	10'	3/8"

C. Cast Iron Pipe: Supported at intervals with rod sizes as follows, double nuts on hangers and on beam clips.

Cast Iron Size	Hanger Intervals	Rod Sizes
1-1/2"	5'	3/8"
2"	5'	3/8"
2-1/2"	5'	1/2"
3"	6'	1/2"

4"	7'	5/8"

D. PVC Pipe: Supported at 4 foot intervals.

E. Verticals: Supported by use of clamp hangers at every story height, and at not more than 6 feet intervals for copper piping 1-1/4" and smaller size.

F. Spring Isolators: All pipe 20' upstream and downstream of pumps.

3.04 CLOSING IN UNINSPECTED WORK

A. General: Cover up or enclose work after it has been properly and completely reviewed.

B. If any of the work is covered or enclosed prior to required inspections and review, uncover the work as required for the test and review. After review, tests and acceptance, repairs and replacements shall be made by the appropriate trades with such materials as necessary for the acceptance by the Architect and at no additional cost to the Owner.

3.05 CLEANUP AND CORROSION PREVENTION

A. Upon completion of the work thoroughly clean and flush piping systems to the sewer with water.

B. Fixtures, piping and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.

C. Caulk around fixtures at floor and wall.

D. Before covering is applied to piping systems, clips, rods, clevises and other hanger attachments, and before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved protective paint applied to these surfaces. When corrosion is from the effects of hot solder paste, the areas shall be cleaned and polished and a wash of bicarbonate of soda and water used to neutralize the acid condition.

3.06 DISINFECTING

A. After the entire potable water system is completed, cleaned and tested, and just before the building is ready to be occupied, disinfect the system as follows: After flushing the mains, introduce a water and chlorine solution for a period of not less than three hours before final flushing of the system.

3.07 TESTS

A. Sanitary soil, waste and vent piping: Fill with water to top of vents, and test as required by Code.

B. Water piping shall be tested to a pressure of 100 lbs. per square inch for at least 30 minutes. Pressure drop in this period shall not exceed two pounds per square inch. Leaks shall be repaired and system retested. Notify Architect 24 hours before test is to be performed.

3.08 INSTRUCTIONS

A. On completion of the project, provide a competent technician to thoroughly instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed four (4) hours. The time of instruction shall be arranged with the Owner.

* END OF SECTION *