SECTION 15400

PLUMBING

1. PART 1 GENERAL

1.1. SUMMARY

1.1.1. Furnish, install, test, and guarantee completely operable and approved Plumbing Systems, which are in full compliance with all Contract Documents, as indicated on the drawings, described herein, and as otherwise required.

1.1.2. This section describes interior and exterior plumbing systems.

1.1.3. Provide Plumbing Submittals and Shop drawings.

1.1.4. A complete system of sanitary sewer piping and venting.

1.1.5. Roof drains, overflow drains and rainwater piping systems.

1.1.6. Domestic hot and cold water piping distribution system, including provisions for all plumbing fixtures and equipment. Provide connections to fixtures and equipment. Provide disinfection.

1.1.7. Reclaimed water piping distribution system with continuous labeling. Provide connections to fixtures and equipment. Provide disinfection.

1.1.8. Provide makeup water supply piping to mechanical equipment and systems such as the heating hot water system. Provide approved backflow preventer for the make up water to the heating water system.

1.1.9. Condensate system for HVAC equipment.

1.1.10. Natural gas piping systems.

1.1.11. Pipe hangers and other necessary support items.

1.1.12. Plumbing equipment such as circulating pumps and water heaters.

1.1.13. Excavating and backfilling.

1.1.14. All Testing required and provide certificates.

1.1.15. Record Drawings.

1.2. RELATED SECTIONS

1.2.1. Section 15010 General Provisions

1.2.2. Section 15250 Mechanical Insulation

1.2.3. Section 15800 Heating, Ventilating and Air Conditioning

1.3. SUBMITTALS

1.3.1. Comply with specification Section 15010 General Provisions.

1.3.2. Required Submittals

1.3.2.1. Plumbing fixtures and components.

1.3.2.2. Plumbing equipment and accessories.

1.3.2.3. Plumbing materials including piping, valves, and fittings.

1.3.3. Required Shop Drawings

1.3.3.1. Routing of all plumbing systems.

1.3.3.2. Sections and isometrics of piping systems.

2. PART 2 PRODUCTS

2.1. SYSTEMS

2.1.1. Sanitary Sewer, Vent and Rainwater Drainage Systems

2.1.1.1. Above Grade - Concealed and Within Building

2.1.1.1.1. Piping shall be of hubless cast iron soil pipe and fittings and shall conform to the requirements of CISPI (Cast Iron Pipe Institute) Standard 301 and ASTM A 888 (Standard Specifications for Hubless Cast Iron Soil Pipe and Fittings). Cast Iron Soil Pipe and fittings for all pipe shall be marked with the collective trademark of the Cast Iron Pipe Institute or receive prior approval of the engineer.

2.1.1.1.2. Joints for hubless pipe and fittings shall conform to the manufacturer's installation instructions, the CISPI Standard 301, and local code requirements.

2.1.1.1.3. Hubless coupling gaskets shall conform to ASTM Standard C 564. Joints shall be made with Mission Bands Model #C220hw, #C-564 neoprene rubber, #A240A band (80 lb.) or Husky heavy weight bands. Heavy weight bands shall be sleeve type assemblies of neoprene inner gaskets and 304 stainless steel multiple clamps and outer shield 304 stainless steel. Above ground vents can have 301 stainless steel bands.

2.1.1.2. Above Grade - Exposed or on the Outside of the Building

2.1.1.2.1. Galvanized iron pipe and fittings, coated inside and outside per ASTM A-74.

2.1.1.2.2. Joints shall be made with threaded joints.

2.1.1.2.3. All exterior pipe shall be primed with primer paint. A second coat of enamel paint shall be applied over the primer. The color of the second coat of paint shall match the color of the exterior wall.

2.1.1.3. Below Grade – From Under Building to Site System

2.1.1.3.1. Either Solid Wall Schedule 40 Polyvinyl chloride (PVC) or Solid Wall Acrylonitrile Butadiene Stryrene (ABS) Gravity Sewer Pipe and Fittings.

2.1.1.3.2. Schedule 40 Solid Wall Polyvinyl chloride (PVC) DWV Gravity Sewer Pipe and Fittings. Solid wall PVC pipe and fittings shall be made by virgin PVC compounds meeting the ASTM D-2665. PVC shall comply with ASTM D-1785. For glue joints, provide Weld-On #2721 medium bodied blue glue.

2.1.1.3.3. Schedule 40 Solid Wall Acrylonitrile Butadiene Stryrene (ABS) DWV Gravity Sewer Pipe and Fittings. ABS pipe and fittings shall be made by virgin ABS compounds meeting the ASTM requirements if Cell Classification 4-2-2-2-2 (pipe) and 3-2-2-2 (fittings). Solid wall pipe shall meet ASTM D-2661.

2.1.1.3.4. Provide protection at penetrations of walls, floors, ceilings and fire resistance rated assemblies in accordance with ASTM E814. The "F" rating must be a minimum of the hourly rating of the fire resistance rated assembly that the plastic pipe penetrates.

2.1.2. Domestic Water System

2.1.2.1. Above Grade Piping System - Type "L" hard temper seamless copper tubing per ASTM B-88, and wrought solder joint: fittings per ANSI B16.22, or cast bronze solder joint fittings per ANSI B16.18. Use 95-5 tin-antimony solder. All exterior water pipe shall be primed with primer paint. A second coat of enamel paint shall be applied over the primer. The color of the second coat of paint shall match the color of the exterior wall.

2.1.2.2. Below Grade Piping System - From Building to Site System: Type "K" hard temper seamless copper tubing per ASTM B-88. Fittings shall be wrought solder joint per ANSI B16.22, or cast bronze solder joint per ANSI B16.18. Use 1000°F silver solder.

2.1.2.3. Above Grade Water Shut Off Valves

2.1.2.3.1. 3/4" pipe size and smaller shall be Nibco T-585-70-66 (threaded) or S-585-70-66 (solder) or equal. Stainless Steel ball, stem, handle nut. Gate valves shall not be installed in water services.

2.1.2.3.2. 1" pipe size and greater shall be Nibco T-595-Y-66 (threaded) or S-595-y-66 (solder) or equal. Three piece body and blowout proof stem. Stainless Steel ball, stem, handle nut. Gate valves shall not be installed in water services.

2.1.2.4. Below Grade Shut Off Valves

2.1.2.4.1. 1/2" pipe size to 2" pipe shall be Nibco T-595-S6-R-66. Provide stainless steel handle, nut, stem and ball. Gate valves shall not be installed in water services.

2.1.2.4.2. 2 1/2" size size and larger shall be Nibco. Class 300 Flanged Ball Valve or equal. Body, stem, nut and ball shall be Stainless Steel A743 GR. CF8M. Ball Valve shall be rated 300 PSI working pressure. Pack gland and stop plate shall be stainless steel.

2.1.3. Reclaimed Water System

2.1.3.1. Provide continuous labeling that water is system is for reclaimed water. Provide continuous tape along the entire reclaimed water system noting that the piping system is "Reclaimed Water".

2.1.3.2. Above Grade Piping System - Type "L" hard temper seamless copper tubing per ASTM B-88, and wrought solder joint: fittings per ANSI B16.22, or cast bronze solder joint fittings per ANSI B16.18. Use 95-5 tin-antimony solder. All exterior water pipe shall be primed with primer paint. A second coat of enamel paint shall be applied over the primer. The color of the second coat of paint shall match the color of the exterior wall.

2.1.3.3. Below Grade Piping System - From Building to Site System: Type "K" hard temper seamless copper tubing per ASTM B-88. Fittings shall be wrought solder joint per ANSI B16.22, or cast bronze solder joint per ANSI B16.18. Use 1000°F silver solder.

2.1.3.4. Above Grade Water Shut Off Valves

2.1.3.4.1. 3/4" pipe size and smaller shall be Nibco T-585-70-66 (threaded) or S-585-70-66 (solder) or equal. Stainless Steel ball, stem, handle nut. Gate valves shall not be installed in water services.

2.1.3.4.2. 1" pipe size and greater shall be Nibco T-595-Y-66 (threaded) or S-595-y-66 (solder) or equal. Three piece body and blowout proof stem. Stainless Steel ball, stem, handle nut. Gate valves shall not be installed in water services.

2.1.3.5. Below Grade Shut Off Valves

2.1.3.5.1. 1/2" pipe size to 2" pipe shall be Nibco T-595-S6-R-66. Provide stainless steel handle, nut, stem and ball. Gate valves shall not be installed in water services.

2.1.3.5.2. 2 1/2" size size and larger shall be Nibco. Class 300 Flanged Ball Valve or equal. Body, stem, nut and ball shall be Stainless Steel A743 GR. CF8M. Ball Valve shall be rated 300 PSI working pressure. Pack gland and stop plate shall be stainless steel.

2.1.4. Natural Gas System

2.1.4.1. Above Grade - Within Building - Schedule 40 black steel with 150 PSI malleable iron screwed or flanged fittings.

2.1.4.2. Above Grade - Exposed or on the Outside of the Building - Galvanized iron pipe and fittings, coated inside and outside per ASTM A-74. Joints shall be made with threaded joints. All pipe and fittings to comply with California Plumbing Code. All exterior pipe shall be primed with primer paint. A second coat of enamel paint shall be applied over the primer. The color of the second coat of paint shall match the color of the exterior wall.

2.1.4.3. Below Grade Site Piping System - Site system shall extend from gas meter's transition riser to pressure regulator's transition riser at the buildings. Piping and fittings - Polyethylene (PE) pipe shall comply with PE 2406 from the Plastics Pipe Institute Material Designation and shall comply with ASTM D2513 and ASTM D3261. PE pipe shall be rated for internal pressure of 76 PSI (3" and below) at 73 degrees F. Acceptable manufacture shall be Performance Driscoplex 6500 Poly Pipe PE 2406 or Plexco Yellowpipe PE 2406 . Provide butt or socket heat fusion joining of pipe and fittings. Saddle tap side-wall or other tapping tees are not acceptable.

2.1.4.4. Transition Riser - Below Grade to Above Grade - Provide one piece natural gas transition riser from PE pipe to galvanized steel pipe. The schedule 40 steel section of the riser shall be epoxy coated. The transition riser shall meet NFPA-58-1992 and ASTM-D2513. Transition Riser (from Polyethylene pipe to galvanized steel) shall be a special one-piece transition riser. The polyethylene pipe to epoxy coated steel pipe shall be used where the gas piping extends from below grade to above grade. The epoxy coated schedule 40 steel pipe riser shall extend to a minimum of 8" above grade.

2.1.4.5. All underground plastic pipe shall have a 14 gauge insulated tracer wire wrapped around pipe and fittings and extend to ends of pipe run. The tracer wire shall extend 6 inches above grade at the ends of the piping systems. Provide yellow warning tape a18" above pipe.

2.1.4.6. Pressure Regulators - Gas pressure regulators from 5 lbs. to 7 inches of water shall be American 1813 C.

2.1.4.7. Gas shut off valves

2.1.4.7.1. 1/2" pipe size to 2" pipe shall be Nibco T-595-S6-R-66. (T=treaded, S6= Stainless Steel, R=Reinforced TFE seat and 66=Stainless Steel Ball). Provide stainless steel handle and nut.

2.1.4.7.2. 2 1/2" size size and larger shall be Nibco. Class 300 Flanged Ball Valve or equal. Body, stem and ball shall be Stainless Steel A743 GR. CF8M. Ball Valve shall be rated 300 PSI working pressure. Pack gland and stop plate shall be stainless steel. Provide stainless steel handle and nut.

2.1.5. Condensate System

2.1.5.1. Above Grade - Type "M" hard temper seamless copper tubing. Wrought solder Type "M" fittings. Use 95-5 tin-antimony solder. Maintain a minimum slope of an 1/8" per foot.

2.1.6. Yard Boxes

2.1.6.1. Provide yard boxes for all below grade valves and regulators.

2.1.6.2. Yard boxes shall be manufactured by Associated Concrete Products, Inc. (ACP). Yard boxes shall be "Quikset" type and be constructed of "Type 2" cement. Provide adjustment rings as necessary to keep cover level with grade. Provide top ring and "TE-1000" traffic cover. Traffic cover shall be galvanized steel. The top of the cover shall be labeled with the type of system it is being used for.

2.2. PIPE SUPPORTS

2.2.1. Hangers shall be Clevis type equal to B-Line B3100 Standard Clevis Hanger.

2.2.2. Pipe Clamp shall be Bolt and Clamp type equal to B-Line B3140 Bolt Pipe Clamp.

2.2.3. Complete hanger system shall comply with be B-Line Seismic Restraints or equal.

2.2.4. Roof pipe supports shall be Pipe Pier, flexible resilient closed-cell polyethlene foam (ETHAFOAM brand - trade mark of the Dow Chemical Company), with strut system built into foam block.

2.3. PLUMBING FIXTURES AND COMPONENTS

2.3.1. Accessible plumbing fixtures shall comply with all of the requirements of California Building Code Section 1115B. Heights and locations of all fixtures shall be according to California Building Code Table 1115B-1. Fixtures controls shall comply with California Building Code Section 1118B.

2.3.2. All water closets, urinals, lavatories and service sinks shall be of the same manufacturer. All stainless steel sinks shall be of the same manufacturer. All floor sinks and floor drains shall be of the same manufacturer. All flush valves shall be of the same manufacturer. All faucets shall be of the same manufacturer.

2.3.3. Water Closets

2.3.3.1. Accessible Water Closets: CBC Section 1115B.2.1

2.3.3.1.1. Height to be between 17-19 inches when measured to top of a maximum 2 inch high toilet seat. Note: 3 inch high seat is permitted only in alteration where the existing fixture is less than 15 inches high.

2.3.3.1.2. Controls to be operable with one hand and shall not require tight grasping , pinching or twisting. Controls for flush valve to be mounted on wide side of toilet area. Controls for flush valves to be no more than 44 inches above finish floor. Force required to activate controls to be no greater than 5 lbs force.

2.3.3.2. Manufactures shall be American Standard or Kohler. Fixtures shall be white, unless otherwise specified. Water closet seats manufactured by Beneke and Olsonite are acceptable. All flush valves to have TPE triple filtered bypass diaphragm. Flush valves manufactured by Sloan or Zurn are acceptable.

2.3.3.3. Vitreous china siphon jet elongated bowl, top spud flush valve. White heavy duty, solid plastic, open front seat with stainless steel hinge posts and concealed check.

2.3.3.4. Provide appropriate carriers, coordinated with pipe chase and fitting type requirements.

2.3.4. Urinals

2.3.4.1. Accessible Urnials: CBC Section 1115B.2.1.1

2.3.4.1.1. Rim to project between 14-17 inches from face of wall.

2.3.4.1.2. Rim to be maximum of 17 inches above finsh floor.

2.3.4.1.3. Flush controls to be operable with one hand and shall not require tight grasping , pinching or twisting. Controls for flush valves to be no more than 44 inches above finish floor. Force required to activate controls to be no greater than 5 lbs force. Note: Electronic automatic flushing controls are acceptable (and preferred).

2.3.4.2. Manufactures shall be American Standard or Kohler. Fixtures shall be white, unless otherwise specified. Water closet seats manufactured by Beneke and Olsonite are acceptable. All flush valves to have TPE triple filtered bypass diaphragm. Flush valves manufactured by Sloan or Zurn are acceptable.

2.3.4.3. Vitreous china siphon jet with top spud flush valve.

2.3.4.4. Provide appropriate carriers, coordinated with pipe chase and fitting type requirements.

2.3.4.5. Urinals shall have brass nipples for dirty arms.

2.3.5. Lavatories

2.3.5.1. Accessible Lavatories:

2.3.5.1.1. Faucet controls: CBC Section 1115B.2.1.2.1 Controls and operating mechanisms to be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist. Force required to activate controls to be no greater than 5 lbs force. Controls to be lever operated, push type or electronically controlled mechanisms. Self- closing valves to remain open for at least 10 seconds.

2.3.5.2. Manufactures shall be American Standard, Kohler, or Eljer are acceptable. Fixtures shall be white, unless otherwise specified. Faucets for lavatories shall be manufactured by Chicago. Provide ADA approved Handy-Shield Safety Covers for exposed piping under lavatories.

2.3.5.3. Countertop - self rimming oval lavatory with faucet. Provide ADA approved Plumberex Handy-Shield Safety Covers Pro-2000 Series, 1/4" wall thickness and 1/4" fins with vandal resistant joining method.

2.3.5.4. Wall Hung - Provide faucet and wall carriers. Provide ADA approved Plumberex Handy-Shield Safety Covers Pro-2000 Series, 1/4" wall thickness and 1/4" fins with vandal resistant joining method.

2.3.6. Stainless Steel Sinks

2.3.6.1. Manufactures shall be Elkay or Just. Faucets for stainless steel sinks shall be manufactured by Chicago, Elkay or Just.

2.3.6.2. All stainless steel sinks are to minimum of 18 gauge.

2.3.6.3. Countertop type shall be self rimming stainless steel sink with faucet.

2.3.7. Showers

2.3.7.1. Standard and ADA compliant within tile enclosure.

2.3.7.2. Manufactures shall be Chicago or Acorn.

2.3.7.3. Provide stainless steel shower head with 2.2 GPM spray, chrome plated shower arm and chrome plated escutcheon. Provide pressure balance mixing valve and floor drain with chrome plated strainer.

2.3.7.4. For ADA showers provide shower head on flex hose and slide bar.

2.3.8. Emergency Eye Wash

2.3.8.1. Emergency eye wash shall be made of ABS colored plastic. Manufactures shall be Bradley, Haws or Acorn.

2.3.9. Electric Water Coolers

2.3.9.1. Accessible Electric Water Coolers: CBC Section 1115B.2.1.5.1

2.3.9.1.1. Provide 18 inches minimum in depth.

2.3.9.1.2. Provide clear knee space under the drinking fountain of not less than 27 inches in height and 8 inches in depth - the depth measurement being taken from the front edge of the fountain.

2.3.9.1.3. Indicate toe clearance of 9 inches in height above finish floor and 6 inches in depth from the front edge of the fountain.

2.3.9.1.4. Note that wall mounted and post-mounted cantilevered drinking fountains and water coolers are to have a clear knee space of 30 inches minimum in width and also a minimum clear floor space 30 inches by 48 inches for a person in a wheelchair to approach it facing forward.

2.3.9.1.5. Bubbler to be activated by manually operated system not requiring a force of more than 5 lbs.

2.3.9.1.6. Bubbler activator to be located within 6 inches CBC 1115B.2.1.5.3 Bubbler of the front edge of the fountain or an electronically controlled device.

2.3.9.1.7. Bubbler outlet orifice to be located within 6 inches of the front edge of the fountain and within 36 inches of the floor.

2.3.9.1.8. Water stream from the bubbler to substantially parallel to the front edge of the fountain.

2.3.9.1.9. Spout to provide a flow of water at least 4 inches high.

2.3.9.2. Manufactures shall be Haws or Acorn.

2.3.9.3. Wall mounted electric water coolers shall be stainless steel type.

2.3.10. Roof and Overflow Drains

2.3.10.1. Manufactures shall be J.R. Smith and Zurn.

2.3.10.2. Roof Drains - Cast iron drains with flashing collar and cast iron dome. Furnish extension for insulated roofs. Under-deck clamp for all but poured-in-place installations. Outlet connection type shall be compatible with piping system. Provide lead flashing for all roof drains.

2.3.10.3. Overflow Roof Drains - Cast iron drains with flashing collar and cast iron dome. Provide 2" high water dam. Installation of the drain assembly, the top of the dam shall be a minimum of 2" above the adjacent finished roof surface. Furnish extension for insulated roofs. Under-deck clamp for all but poured-in-place installations. Outlet connection type shall be compatible with piping system. Provide lead flashing for all roof drains.

2.3.11. Area Drains

2.3.11.1. Manufactures shall be J.R. Smith and Zurn.

2.3.11.2. Exterior Walkways & Terraces - Promenade area deck drain with square grate.

2.3.12. Floor Drains

2.3.12.1. Manufactures shall be J.R. Smith and Zurn.

2.3.12.2. Duco cast iron drain body with adjustable nickel bronze strainer.

2.3.12.3. Provide trap primer connection as required per drawings.

2.3.12.4. Provide no-hub outlet connection.

2.3.13. Floor Sinks

2.3.13.1. Manufactures shall be J.R. Smith and Zurn.

2.3.13.2. Cast iron flanged receptor, acid resistant coated interior, aluminum dome bottom strainer; 1/2 grate nickel bronze top when specified on drawings.

2.3.14. Trap Primers

2.3.14.1. Manufactures shall be J.R. Smith or PPP are acceptable.

2.3.14.2. Trap primers shall be cast bronze.

2.3.14.3. Provide ball shut off valve and union before trap primer.

2.3.14.4. Provide 14" X 14" access panels for removal. Material and Manufacturer: Stainless Steel Series is 16 gage #304 stainless steel door and frame. Provide cylinder key lock. MIFAB UA-SS or Elmdor DW-14X14-SS-CL. All cylinder locks are to be keyed alike.

2.3.15. Cleanouts

2.3.15.1. Manufactures shall be J.R. Smith and Zurn.

2.3.15.2. Floor Clean Outs

2.3.15.2.1. Duco cast iron cleanout with round adjustable scoriated secured nickel bronze top. Secure plate with countersunk head. Bronze plug. Spigot oulet.

2.3.15.2.2. FCO shall be equal to JR Smith 4023SNB.

2.3.15.3. Wall Cleanouts

2.3.15.3.1. Cast iron branch cleanout tee, with threaded bronze plug, and polished stainless steel cover plate with center, counter-sunk head securing screw.

2.3.15.3.2. WCO shall be equal to JR Smith 4532S.

2.3.15.3.3. Provide 14" X 14" access panels for removal if needed. Material and Manufacturer: Stainless Steel Series is 16 gage #304 stainless steel door and frame. Provide cylinder key lock. MIFAB UA-SS or Elmdor DW-14X14-SS-CL. All cylinder locks are to be keyed alike.

2.3.15.4. Grade Clean Outs

2.3.15.4.1. Finished Concrete Areas - Duco cast iron cleanout with round adjustable scoriated secured nickel bronze top. Secure plate with countersunk head. Bronze plug. Spigot oulet. GCO shall be equal to JR Smith 4023SNB.

2.3.15.4.2. Dirt, Grass, Asphalt and other exterior areas - Duco cast iron cleanout. Bronze plug. Spigot oulet. GCO shall be equal to JR Smith 4283S. Provide precast concrete vault box with heavy duty cast iron cover. Cover shall state "SEWER". Concrete vault shall be larger enough to get tools into box and remove bronze plug.

2.3.16. Hose Bibb

2.3.16.1. Manufactures shall be Acorn or J.R. Smith.

2.3.16.2. Provide vacuum breaker.

2.3.16.3. Mount at 24" A.F.F. unless otherwise noted.

2.3.17. Water Pressure Reducing Valve

2.3.17.1. Manufactures shall be Watts or Wilkens.

2.3.17.2. Provide separate stainless steel strainer for each water pressure-reducing valve. Connections shall be threaded.

2.3.17.3. Set pressure to maximum of 80 P.S.I.

2.3.17.4. Provide pre-cast concrete yard box with galvanized lid for water pressure reducing valves below grade.

2.3.18. Backflow Preventer

2.3.18.1. Manufactures shall be Watts or Wilkins.

2.3.18.2. Approved by local building department and comparable "Reduced Pressure Principle" type.

2.3.18.3. Size shall be the same as pipe in which they are installed, and shall be selected for minimum pressure drop.

2.3.19. Water Hammer Arresters

2.3.19.1. Manufactures shall be J.R. Smith and Zurn.

2.3.19.2. WHA-1 shall be equal to JR Smith 5005 for fixture units 1-11, JR Smith 5010 for fixture units 12-32, JR Smith 5020 for fixture units 33-60, JR Smith 5030 for fixture units 61-113 and JR Smith 5040 for fixture units 114-154.

2.3.19.3. Stainless steel completely sealed water hammer arresters.

2.3.19.4. Provide on cold waterlines in an upright position at all quick closing valves, solenoids, and plumbing fixtures. Locate and size in accordance with Plumbing and Drainage Institute Standard No. WH201.

2.3.19.5. Provide ball shut off valve and union before water hammer arrester.

2.3.19.6. Provide 14" X 14" access panels for removal. Material and Manufacturer: Stainless Steel Series is 16 gage #304 stainless steel door and frame. Provide cylinder key lock. Equal to MIFAB UA-SS or Elmdor DW-14X14-SS-CL. All cylinder locks are to be keyed alike.

2.3.20. Plumbing Fixture Components

2.3.20.1. Traps above floor, exposed or in cabinets, shall be a minimum of 17 gauge chrome plated brass, adjustable with cleanout plug, installed with escutcheon with set screw; all chrome plated. Provide chrome plated slip nuts. No die cast metal allowed.

2.3.20.2. Exposed angle stops shall be loose key (requires 1/8" Allen Key) Aquaflo V-609-AB angle brass. Inlet = 1/2" F.I.P. Outlet = Hose Thread 1/2".

2.3.20.3. Supply tubes shall be Brasscraft stainless speedi-plum.

2.3.20.4. All water line nipples above and below grade shall be brass type. No galvanized or black steel type will be allowed.

2.3.20.5. Water and gas ball shut off valves in walls or drywall ceilings provide 18" X 18" access panels for access and removal of ball valves. Material and Manufacturer: Stainless Steel Series is 16 gage #304 stainless steel door and frame. Provide cylinder key lock. Equal to MIFAB UA-SS. All MIFAB cylinder locks are keyed alike.

2.4. PLUMBING EQUIPMENT

2.4.1. Domestic Hot Water Circulating Pump

2.4.1.1. Manufactures shall be Armstrong, Bell and Gosset, Grunfos or Taco.

2.4.1.2. Provide all bronze or stainless steel in-line circulating pump of size and capacity as scheduled on the drawings.

2.4.1.3. Pump to have integral thermal overload protection

2.4.1.4. Provide "Aquastat" (pipe line heat sensitive thermostat) for on/off operation.

2.4.2. Domestic Water Heaters

2.4.2.1. Manufactures shall be A.O.Smith or Lochinvar. Make and model number of water heater to be on the State of California approved list for energy efficiencies.

3. PART 3 EXECUTION

3.1. PIPE INSTALLATION

3.1.1. Cast-Iron Soil Pipe Institute Pamphlet #100 and the I.A.P.M.O. IS-6-75.

3.1.2. Cast iron and ABS pipe shall be installed per California Plumbing Code.

3.1.3. Joints in copper tubing shall be made by first thoroughly reaming, removing all burrs, and cleaning the surface of the pipe and fittings; applying flux and sweating with lead free solder.

3.1.4. All piping shall be isolated from other piping, any part of the building, framing conduit, etc., with 2-inch wide strips of hair felt with sticky back.

3.1.5. Flush out all water mains and sanitary drains with water so as to obtain free flow.

3.1.6. Unions shall be installed after each screw-type valve, connections for all equipment, appliances and as required for erection and maintenance. No unions shall be installed in concealed location.

3.1.7. Sleeves for piping through masonry walls or floors shall extend completely through the walls or floors. Sleeves shall finish flush on both sides. Provide risers clamps at all floor penetrations.

3.1.8. Unions shall be installed after each screw-type valve, connections for all equipment, appliances and as required for erection and maintenance. No unions shall be installed in concealed location.

3.1.9. All condensate drains to have clean-outs at each horizontal run. Clean-outs shall be F.I.P. thread brass plugs.

3.1.10. All roof drains shall be graded at a minimum of 1/4" per foot unless other wise noted on the drawings. The sections of the pipe shall be laid and fitted so when completed the sewer will have smooth and uniform invert.

3.1.11. All sanitary sewers, sanitary waste and condensate lines and shall be graded at a minimum of 1/4" per foot unless other wise noted on the drawings. The sections of the pipe shall be laid and fitted so when completed the sewer will have smooth and uniform invert.

3.1.12. Site natural gas piping shall have a minimum of 30" of cover or be 30" below finished floor. Provide tracer wire around pipe. Tracer wire shall be 14 gauge copper wire with plastic covering. Tracer wire shall extend 6 inches above grade at the ends of the piping systems. Provide warning tape a minimum of 18" above pipe.

3.2. VALVE INSTALLATION

3.2.1. Provide adequate access around valve and valve handle for maintenance.

3.2.2. Natural gas or Water ball shut off valves in walls provide 18" X 18" stainless steel access panels for access and removal of ball valves.

3.2.3. Natural Gas or Water ball shut off valves in drywall ceilings provide 24" X 24" stainless steel access panels for access and removal of ball valves.

3.2.4. Underground valves shall be installed with SA 316 stainless steel bolts, nuts and washers.

3.2.5. Underground water service valves shall have Bit-50 applied to the valve, bolts, nuts and washers. All underground water service valves shall be wrapped with 8 mil clear plastic. The 8 mil clear plastic shall be attached to the valve with 2 wraps of 10 mil tape or one wrap of 20 mil tape.

3.2.6. Underground water service valves shall have the shut off within 18" of finish grade. Steel valve stem extensions shall be provided with valve. Valve stem extensions to be used shall be from Pipeline Products - Model #SX900 with galvanized shafts and fixed center ring.

3.3. PRESSURE REGULATORS

3.3.1. Domestic Water: A reduced pressure regulator device with a strainer shall be installed per local code requirements as indicated on the drawings. There shall be a Nibco T-595-Y-66 shut valve before the pressure regulator. Provide 150 lb. cast brass companion flanges each side of the regulator with stainless steel bolts. As noted on the drawings provide all items in a pre-cast concrete yard box with a reinforce galvanized steel lid. The lid shall have the word "WATER" on it.

3.3.2. Natural Gas: Provide "medium to low" pressure natural gas regulators at all buildings being served by natural gas. Gas vent for regulator shall be installed with the vent pointing down. Provide a natural gas shut off valve before each pressure regulator. Provide two galvanized unions, one on each side of the pressure regulator. All pressure regulators shall be outside of buildings and mounted to the wall. Size natural gas regulator based on natural gas quantities listed on the drawings.

3.4. CLEANOUTS

3.4.1. Cleanouts shall be installed where shown on plans and where required by code. Cleanouts shall be accessible in all cases and shall be brought to surface on "Y" branches. All cleanouts shall be provided with removable floor or wall plate as specified.

3.4.2. As required in walls or drywall ceilings provide 14" X 14" stainless steel access panels for access with cylinder locks.

3.5. PIPEING ASSEMBLIES, HANGERS AND ROOF SUPPORTS

3.5.1. All piping shall be concealed in walls, furred spaces, pipe spaces, or above suspended ceilings. Piping shall be grouped wherever practical and shall be installed uniformly in straight parallel lines in either vertical or horizontal positions and at right angles with beams, walls, ceilings or other building lines. Install all exposed piping as close as practical to walls, columns or overhead construction to provide maximum head room and minimum interference with usable building space. Where interference develops in the field, piping shall be offset or routed as required.

3.5.2. Pipe shall be installed to eliminate sagging.

3.5.3. All pipe, fittings and valves shall bear manufacturer's name and trademark, and valves shall have service and pressure rating cast in bodies.

3.5.4. Piping passing through poured concrete floors shall be sleeved and wrapped with plastic foam or fire stop material as appropriate with 50% overlap.

3.5.5. Piping shall be firmly held in place by galvanized hangers, supports and pipe rests, located adjacent fittings at each offset or change of direction, at the ends of branches over 5' long, at riser pipes and along piping where necessary to prevent sags, bends, or vibration. All hangers and supports shall be designed to support the weight of pipe, fluid and insulation.

3.5.6. Lateral bracing shall be provided at every fourth hanger where hanger rods are more than 12 inches in length.

3.5.7. Hanger Spacing

3.5.7.1. Domestic and Reclaimed Water, Natural Gas and Condensate piping:

3.5.7.1.1. 1/2" to 2" pipe every 6'- 0" or less.

3.5.7.1.2. 2 1/2" and larger pipe every 8'- 0" or less.

3.5.7.2. Soil, Waste, Vent and Rain Water Leaders shall be provided with a hanger for at least every joint except that when the developed length between hangers is less than 4 feet they shall be provided at every other joint. Hangers shall also be provided at each horizontal branch connection.

3.5.7.3. Refer to B-Line Seismic Restraints manual approved by California Office of Statewide Health Planning and Development for other spacing and support conditions.

3.5.8. Pipe Supports on Roof:

3.5.8.1. Roof pipe supports shall be Pipe Pier, flexible resilient closed-cell polyethlene foam (ETHAFOAM brand - trade mark of the Dow Chemical Company), with strut system built into foam block.

3.5.8.2. Foam block size:

3.5.8.2.1. 4" high X 4" wide for 1/2" to 2" pipe diameter pipe

3.5.8.2.2. 4" high X 6" wide for 2" and larger pipe diameter

3.5.9. Pipe Support Spacing on Roof

3.5.9.1. Pipe: 1/2" to 2" pipe every 6'- 0" or less.

3.5.9.2. Pipe: 2" and larger pipe every 8'- 0" or less.

3.6. FIXTURE INSTALLATION

3.6.1. All fixture piping shall be flushed-out in the presence of the Owner's Representative prior to connecting any fixtures.

3.6.2. Water piping and drain connections shall not be smaller than the sizes allowed by the plumbing code.

3.6.3. Furnish all fixtures complete with supplies, individual stops, traps, escutcheons, trim and all other accessories to provide a complete fixture. Fixtures shall be set in place and secured to walls. Provide ADA trap and piping wrap at lavatories and sinks per ADA requirements.

3.6.4. All plumbing fixtures shall be bedded and caulked along joint at walls, countertops, and other intersecting surfaces with DAP Kwik-Seal Tub and Tile adhesive caulk. DAP package code number shall be 18001 white caulk.

3.6.5. Caulk around the bases of toilets, urinals and vitreous china sinks.

3.6.6. All faucets to be installed using "Plumber Putty" under the base of the faucet for a watertight seal.

3.6.7. Plumbing fixture trim and exposed supplies and waste shall be brass with polished chrome plated finish. Polished chrome plated piping, fittings, and valves shall not bear tool marks.

3.6.8. Provide backing for each plumbing fixture requiring same, at the time roughing-in is done.

3.6.9. After the fixture installation is complete, cover and protect the rims, front, and all exposed parts until the completion of the construction phase. The plumbing contractor shall be responsible for all damage to fixtures, and shall assume all related costs.

3.7. CLEANING EQUIPMENT AND PREMISES

3.7.1. Thoroughly clean all parts of piping, fixtures and equipment.

3.8. STERILIZATION OF DOMESTIC AND RECLAIMED WATER SYSTEMS

3.8.1. All domestic water piping systems shall be cleaned, flushed and sterilized with chorine in accordance with the standards of the county health department or other governing codes. The sterilization shall meet the minimum requirements or the EPA National Primary Drinking Water Regulations. During the flushing period, all valves and faucets shall be opened and closed several times. Take a minimum of two samples from each building or remodeled area. Provide a laboratory report and certificate from an independent Analytical and Consulting Chemists laboratory. Forward the report and certificate to Architect.

3.9. TESTS AND ADJUSTMENTS

3.9.1. No piping work, fixtures, or equipment shall be concealed or covered until they have been inspected and approved by the Owner's Representative who shall be notified when the work is ready for inspection. All work shall be completely installed, tested as required by this section and the State Ordinances and State Safety Orders, and shall be leak-tight before inspections requested. All tests shall be repeated upon request to the satisfaction of those making the inspection.

3.9.2. Before testing, remove or otherwise protect from damage components which are not designated to withstand the test pressures.

3.9.3. Provide all necessary water, electric power, and other service and instruments required to perform tests.

3.9.4. Plumbing fixture fittings and valves shall be operated to assure acceptable performance without leaks. All systems and equipment: shall be adjusted to eliminate excessive noise and vibration.

3.9.5. Make necessary adjustments, repairs and alterations to satisfy specified testing requirements, correct defects disclosed by tests or inspections, and replace defective parts. Completely remake defective pipe joints.

3.9.6. Repeat tests on defective portions of the work until compliance with testing requirements has been proven.

3.9.7. Bear the cost of repairs and restoration of work of other Contractors, which were damaged by the testing procedures.

3.9.8. Provide tests on all equipment and fixtures. Comply with all manufacturer's instructions for start-up, operating and maintaining of all equipment and fixtures.

3.9.9. Perform oiling, lubrication, greasing etc. as required.

3.9.10. Piping tests shall be made with the medium and under pressure listed below.

3.9.10.1. Soil, Waste, Vent, Rainwater Leaders, and Condensate

3.9.10.1.1. Water with minimum of 10-foot head at each joint for duration of test.

3.9.10.2. Domestic and Reclaimed Water

3.9.10.2.1. Water with minimum of 125 PSI for duration of test.

3.9.10.3. Natural Gas

3.9.10.3.1. Air with minimum of 50 PSI for duration of test.

3.9.10.4. Test period length

3.9.10.4.1. Four (4) hours for each system.

3.9.10.4.2. If there has been more than two (2) failures in a plumbing system when tested then test period shall be a minimum of 12 hours.

END OF SECTION