

SECTION 15400
PLUMBING SYSTEMS

PART 1 GENERAL

1.01 Not used

1.02 SUMMARY:

- A The Contractor shall provide Plumbing Systems as shown on the drawings and as specified in this Section including, but not necessarily limited to:
 - 1. Applications and fees required for plumbing permits, utility services, and interim and final inspections.
 - 2. Coordination with utility companies for utility services.
 - 3. Temporary water provisions as required for construction purposes
 - 4. Excavation and backfill, concrete pads and pits for plumbing systems work.
 - 5. Domestic hot and cold water piping systems, including backflow preventers. By definition, the word "piping" in this Section means completely assembled pipe, fittings, nipples and valves.
 - 6. Drain, waste and vent systems
 - 7. Gas piping system and final gas connections to HVAC equipment
 - 8. Plumbing fixtures, fittings, valves, access panels and accessory items.
 - 9. Sterilization of the potable water system.
 - 10. Cathodic and dielectric protection
 - 11. Seismic Restraints (as may be required by the local jurisdiction)
 - 12. Cutting and patching, testing, adjusting and balancing.

1.03 RELATED WORK:

- A Section 07720-Roof Accessories; rooftop gas piping mounting pedestals.
- B Section 15255-Seismic Restraints.
- C Work by Others: Parts of the building Plumbing Systems in the Aquarium Area will be provided by PETCO Vendor(s) in contract agreements directly with PETCO, with supplementary work by the Contractor Refer to Section 10300- PETCO-Furnished & Contractor-Provided Items.

1.04 SUBMITTALS: Prepare submittals and any Request for Product Substitutions per Section 01340-Submittals The Contractor shall provide the following:

- A Floor Drains and Hair Interceptor Product Data.
- B Plumbing Fixtures and Fittings Product Data
- C Piping Materials Product Data

1.05 QUALITY ASSURANCE:

- A. All materials, apparatus, equipment and installation shall comply with the most stringent standards between applicable building and plumbing codes and ordinances, State Industrial Accident Commission, Underwriters' Laboratory and National Board of Fire Underwriters
- D. Drawings and Coordination:

1. The Contractor shall verify the dimensions governing the plumbing work in the building. Because of the scale of the plumbing drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required to meet all conditions. The Contractor shall examine adjoining work, on which plumbing work is dependent for proper operation, and must report any work that must be corrected.
 2. If the proposed equipment requires structural, mechanical or electrical space conditions than those shown on the drawings, the Contractor shall allow for the cost of such modifications in the contract sum. No waiver of responsibility for defective work shall be accepted due to failure to record and accommodate unfavorable conditions.
- E. Roof Penetration: The Contractor shall coordinate the installation of all roof penetrations so that the roof warranty is NOT altered, modified, or voided.

1.06 WARRANTY/CLOSEOUT DOCUMENTS:

- A. Manufacturer's Warranty: The Contractor shall include a copy of the manufacturer's product warranties in the Building Maintenance Manuals submitted to PETCO per Section 01700-Contract Closeout.
- B. Building Maintenance Manuals: The Contractor shall include Plumbing Systems instructional and maintenance information per Section 01700- Contract Closeout.

PART 2 PRODUCTS

2.01 DOMESTIC AND FILTERED WATER SYSTEM:

- A. Copper Water Lines: Provide Type "L" hard drawn, meeting ASTM B88-7, for all water pipe above concrete or ground. Provide Type "K" hard drawn, meeting ASTM B88-7, for water pipe set in or under concrete or in the ground. Wrap lines below concrete floors with 5 mils polyethylene tape, and insulate with Armaflex insulation. No fittings shall be under the slab.
- B. Fittings: Provide wrought copper meeting ANSI B16.18 and ANSI B16.22.
- C. Identification: Type "K" Copper (Color Green), and Type "L" Copper (Color Blue).

2.02 GAS PIPING SYSTEM:

- A. Provide Schedule 40 black steel pipe meeting ASTM A120 and ASTM A53 with extra-heavy malleable iron banded thread fittings. Unions shall be ground iron to bronze seat. Plug valves to be Rockwell-Nordstrom No. 142. Provide extra-heavy black malleable iron banded fittings, with screwed or weld pattern for pipes 3" and smaller, welded for 4" and larger. Factory spiral wrapped in two directions, using Scotch Wrap 10 mil tape with one inch overlap for all underground piping. Provide drip legs on all mains and risers and at equipment connections, and gas cocks at all equipment connections.
- B. Rooftop Piping Supports: Refer to Section 07720-Roof Accessories. Wood blocking with pipe clamps is NOT an acceptable means of supporting horizontal gas piping located on the roof.

2.03 SANITARY DRAINAGE SYSTEM:

- A. Waste & Vent Lines:
 1. Cast Iron-Aboveground: Provide cast iron, standard weight, no-hub soil and vent pipe, coated inside and out, meeting CISPI 301-69T, for all soil and waste lines above ground and for all vent lines with inside diameter 2 inches and larger.

2. Cast Iron-Under Building: Service weight cast iron pipe with bell and spigot joints and fittings. Underground pipe may be installed with "Tyseal" gaskets
 - a. Where allowable by the applicable plumbing code, plastic DWV piping may be used under slab and where concealed by walls. No PVC piping shall be installed in exposed areas or in areas that may be considered a plenum. PVC-DWV plastic pipe for sanitary drainage and vent and storm drainage systems shall meet ASTM D1784, ASTM D2665, and Fed. Spec. L-P-320a Pipe and Fittings, Plastic (Polyvinyl Chloride, PVC Drain, Waste and Vent) Pipe, fittings, and solvent cement shall be equal to products by Celanese Piping Systems

2.04 PIPE HANGERS & SUPPORTS:

- A. Rooftop Piping Supports: Refer to Section 07720-Roof Accessories. Wood blocking with pipe clamps is NOT an acceptable means of supporting horizontal gas piping located on the roof.
- B. Pipe Hanger Maximum Spacing:
 - 1 Steel Pipe: 1-1/4" and smaller, 8'-0" OC; 1-1/2" and larger, 10'-0" OC
 - 2 Copper Tubing: 1-1/4" and smaller, 6'-0" OC; 1-1/2" and larger, 10'-0" OC.
 - 3 Plastic Pipe (Where Allowed): 1-1/2" and smaller; 3'-0" OC; 2" and larger, 4'-0" OC.
- C. Isolators: Install Trisolator #500 isolators around all uninsulated copper lines at hangers. Install dielectric fitting between all ferrous and non-ferrous piping with a 12" section of red brass pipe.
- D. Hanger Size: Size hangers on insulated lines to fit around outside diameter of insulation with allowance for sheet metal shield. Pipe shield shall be sized as 1/3 the circumference of the insulation with length of not less than 3 times the diameter of the insulation (maximum 24"). Acceptable manufacturers: Grinnell, Grabler, Fee & Mason, Elcen.
- E. Overhead Supported: Each horizontal pipe shall be supported on adjustable wrought iron clevis hangers equal to Grinnell, Figure 260, except that groups of pipes shall be supported on trapeze hangers made up of steel rods and steel channels or angles. Pipe shall be "U" bolted to trapeze and trapeze spaced for the smallest pipe in the group.
- F. Wall Supported: Horizontal piping on walls shall be supported by cast iron bracket equal to Grinnell Figure 213, with Figure 260 Clevis type hanger attached.
- G. Vertical Piping: Support at floor level with supports equal to Grinnell Figure 261.
- H. Inserts: Inserts in concrete shall be equal to Grinnell Figure 281.

2.05 VALVES & ACCESSORIES:

- A. Provide Valves to control hot and cold water branches to each group of fixtures, and to individual fixtures and equipment. Where used with chrome plated pipe, valves shall be chrome plated.
 1. Acceptable Manufacturers: Milwaukee, Crane Jenkens, Walworth, Kennedy, Stockham, Nibco-Scott
 2. Gate Valves: Milwaukee #1145, 125# bronze body, solder type gate valve with non-rising stem for all lines up to 4 inches in diameter.
 3. Check Valves: Milwaukee #1508, 125# bronze body, solder type check valve with horizontal bronze disc for all valves up to 2 inches in diameter. Milwaukee #2974, 125# iron body, bronze trimmed, flanged horizontal check valve for all valves larger than 2".

4. Balancing Valve: Milwaukee #1350, 125# bronze body, solder joint balancing valve.
 5. Plug Valves: Rockwell-Nordstrom #142 (2" lines and smaller) and #143 (2-1/2" and larger); with lubricated plug valve for natural gas service.
 6. Globe Valves: Milwaukee #1502, 125# bronze body, solder joints, with bronze disc when up to 2" in diameter.
 7. Ball Valves: Nibco-Scott #T595, or #S595, 150# bronze body, chrome plated ball, teflon seats.
 8. Gas Valves: Rockwell-Nordstrom #143 with #555 lubricant for natural gas service.
- B. Valve Boxes: Mueller #H-10360, Size 564 S, screw type, 5-1/4" shaft with "WATER" cast in lid.
 - C. Trap Primers: Provide automatic trap primer on cold water supply at nearest fixture and run drain to trap seal being protected. Provide Access Panel where concealed in walls.
 - D. Backflow Preventer: Provide reduced pressure principle Backflow Preventer on domestic water lateral to the building if required by the local jurisdiction. Backflow Preventer shall be equal to Watts #909.
 - E. Air Cushions and Shock Absorbers: Provide full size vertical air cushion not less than 12 inches long and 1 inch pipe size, shock absorbers at each hot and cold water connection to a fixture or faucet, equal to Zurn #A-1700 size 400, Josam #14800 or Wade #W-20.
 - F. Vacuum Breakers: Provide on faucets, hydrants, and other water discharge points with threaded hose connector, where shown on drawings or required by applicable Code, equal to Watts #8-A. Vacuum Breakers for general piping application shall be equal to Watts #288A.

2.06 TRAPS:

- A. All fixtures and floor drains are to be separately trapped as near to the fixture or floor drain as possible. Traps shall be self-cleaning, water-sealed, and shall have a scouring action. Traps shall be set true with respect to water seal and shall be protected from freezing. All underground traps, except "P" traps into which floor drains with removable strainers discharge, shall be provided with accessible cleanouts. Traps which are not part of plumbing fixtures shall be of the same material and size as pipes or branches into which they discharge. All traps shall be installed with provision for cleaning.
- B. Traps exposed above the floor shall be chrome plated adjustable brass, with chrome plated approved cleanout plugs, cast set screw wall escutcheon and casing.

2.07 CLEANOUTS:

- A. Where indicated on the drawings and as required by the local jurisdiction. Make all cleanouts accessible by one of the following means:
 1. Within 6 inches from ceiling access panel.
 2. Extending to floor or grade above.
 3. Locate in wall with removable plate.
- B. Cleanouts CANNOT be located in areas where Epoxy Flooring is scheduled.
- C. Size: Same as pipe on which installed.
- D. Installation: Covers set flush with finished wall, floor or grade, to be securely anchored by means of integral lugs or bolts. Where surfacing materials such as resilient flooring is used, install the clean out with top so that finished surface is smooth and flush.

- E Acceptable Manufacturers: Zurn, Josam, Wade, Jay R. Smith.
- F. Floor Cleanouts and Access Covers: Figure 4020 with Duco coated cast iron body and frame with "Leckeromated" plug and heavy duty adjustable scoriated secured nickel bronze top.
- G Cleanout to Grade with Countersunk Plug: Figure 4283 with Duco-coated cast iron body with bronze taper thread countersunk plug Installed in 24" x 24" concrete pad, tapered for drainage.
- H. Wall Cleanouts: Figure 4710 stainless steel chrome plated bronze deep cover with center screw

2.08 FLOOR DRAINS: Floor drains shall be by Jay R. Smith, Zurn, Josam or Wade, as scheduled.

2.09 VENTS THROUGH ROOF: Offset vents through roof as required to maintain a minimum distance of 10 feet away from outside air intakes.

2.10 PIPING INSULATION:

- A Provide piping insulation for domestic hot, tempered, filtered and cold water lines, condensate and rainwater conductor piping, continuous through wall and ceiling openings and sleeves. No insulation shall be installed on any piping before the building is adequately closed in.
- B. Materials and Installation: No pipe insulation shall be applied until piping has been pressure tested and approved. All insulation shall be applied strictly in accordance with the manufacturer's recommendations. Insulation Products by Johns Manville, Phillip Carey or Armstrong will be acceptable if equal to those specified. All insulation on indoor work shall have composite fire and smoke hazard ratings as tested by procedure NFPA 255 not exceeding Flame Spread 25, Fuel Contributed 50, Smoke Developed 50. Accessories, such as adhesives, mastics, cements, tapes, and cloth for fitting, shall have the same component ratings as listed above. Insulation shall have an average thermal conductivity not to exceed 0.25 BTU/inch of thickness per square foot per 1 degree F. at a mean temperature of 75 degrees F.
- C. Hot, Cold, Filtered, Tempered Water Piping: Insulate with 1" thick fiberglass pipe insulated with foil-kraft laminate vapor barrier fastened with pressure sensitive tape and stapled. All fittings, valves and flanges shall be covered with PVC fitting cover, taped and tacked fastened.
- D. Rainwater Conductor Insulation: Provide insulation where rainwater conductors run inside the building.
- E. Condensate Line Insulation: Provide insulation where condensate lines run inside the building.
- F. Scald Guard at Handicap Accessible Lavatories: Provide "Handi Lav-Guard" Kit No. 101, Color White, by Truebro Inc., Ellington CT (203/ 875-2868) at each handicap accessible lavatory.

2.11 PLUMBING FIXTURES:

- A Provide Plumbing Fixtures per Plumbing Fixture Schedule, complete with trim and caulk

1. Vitreous fixtures shall be Class "A" vitreous. All surfaces that contact walls, floors, or surfaces of other fixtures shall be ground free of defects affecting the final fittings of the fixture. Warped, imperfect fixtures are NOT acceptable.
2. All Plumbing Fixtures supported from walls shall be provided with manufactured fixture carriers, or with 6" high x 3/8" thick x (length required) steel plates, welded to structural framing and tapped for plumbing fixture bolts.
3. Acceptable Manufacturers: Refer to Plumbing Fixture Schedule.

2.12 ACCESS PANELS:

- A. The Plumbing Subcontractor shall furnish Access Panel for the Contractor's installation in finished work, for concealed valves, cleanouts, and other parts of the Plumbing Systems that require access for maintenance and repair
- B. Access Panels shall be properly sized for servicing terms requiring access, minimum size 18" x 18", 13 GA primed flush steel door and trim, concealed hinges and screwdriver operated via stainless steel cam lock. Access Panels are not required at suspended acoustical ceilings
- C. Access Panel locations shall be verified with the PETCO Project Manager prior to installation.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS: The Contractor shall examine the areas and conditions under which work of this Section will be provided, shall correct conditions detrimental to the timely and proper completion of the work, and shall NOT proceed until unsatisfactory conditions are corrected.

3.02 PLUMBING SYSTEM LAYOUT: Layout the plumbing system per the drawings, determining proper elevations for all components of the system and using only the minimum number of bends to produce a properly operating system. Follow the general layout shown on the drawings in all cases except where other work may interfere. Layout pipe runs to fall within the partition, wall or roof cavities, with no additional furring other than as specifically shown on the drawings. Coordinate floor and wall cleanout locations with the drawings and the PETCO Project Manager. Cleanouts CANNOT be located in areas where Epoxy Flooring is scheduled.

3.03 DEMOLITION & PATCHING: No structural member shall be cut without the written consent of the Structural Engineer of Record. All finish surfaces requiring demolition and patching for Plumbing Systems work shall be restored to match the adjacent finish.

3.04 TRENCHING & BACKFILLING:

- A. Provide trenching and backfilling per Section 02220-Trenching
- B. Cut bottom of trenches to grade. Make trenches 12" wider than the greatest pipe dimension.
- C. Bedding and Backfilling: When under the floor slab, install pipes on a 6" bed of damp sand. Backfill to the bottom of the slab with damp sand. When beyond the building, install underground piping on a 6" bed of damp sand. Backfill to within 12" of finish grade with damp sand. Backfill remainder with native soil.

3.05 PIPING & EQUIPMENT INSTALLATION:

- A. General:

- 1 Thoroughly clean items before installation. Cap pipe openings to exclude dirt until fixtures are installed and final connections have been made. Protect finish surfaces to prevent damage during construction.
- 2 Cut pipe accurately and work into place without springing or forcing, properly clearing windows, doors and other openings.
- 3 Run horizontal sanitary and storm drainage piping at a uniform grade of 1/4" per foot, unless otherwise noted. Run horizontal water piping with an adequate pitch upwards in direction of flow to allow complete drainage.
- 4 Support piping independently at pumps, coils, tanks, and similar locations, so that the weight of the piping is not supported by the equipment. Do not use wire for hanging pipes.
- 5 Provide union and shut-off valves to facilitate removal of equipment and apparatus.
- 6 Provide all work to permit expansion and contraction of piping systems.
- 7 Provide all plumbing and piping connections to equipment furnished by PETCO, including rough-in work, P-traps, waste tubing, stops and flexible tube riser, and final connections. Make final connections to HVAC Systems equipment. Provide valves or fixtures stops, ahead of all equipment and on all stub outs.
- 8 Equipment Access: Install piping, equipment, and accessories to permit access for maintenance where required. Provide Access Panels as required and verify acceptable locations with the PETCO Project Manager.

3.06 SLEEVES & OPENINGS:

- A Provide sleeves for each pipe passing through walls, partitions, floors, roofs, and ceilings.
 - 1 Uninsulated pipe: Provide sleeves two pipe sizes larger than the pipe passing through, or provide a minimum of 1/2" clearance between inside and outside of the pipe.
 - 2 Insulated pipe: Provide sleeves of adequate size to accommodate the full thickness of pipe covering, with clearance for packing and caulking.
- B Caulk the space between sleeve and pipe or pipe covering, with sealant as specified in the Sealants and Caulking Section, or pack with non-combustible packing material to within 1/2" of both wall faces and caulk.
- C. Finish and Escutcheons: Provide chrome or nickel plated escutcheons on all pipes exposed to view where passing through walls, floors, partitions, ceilings, and similar locations.

3.07 VALVES: Provide valves where shown on the drawings; in branches and/or heaters of water piping serving a group of fixtures; on both sides of apparatus and equipment; for shutoff of risers and branch mains; for flushing and sterilizing the system.

3.08 WATER HAMMER ARRESTORS: Provide water hammer arrestors on water lines, installed in upright position at all quick closing valves, solenoids, isolated plumbing fixtures, and supply headers at plumbing fixtures. When fixtures are not protected by water hammer arrestors, provide 24" high air chambers on each water supply, properly sized and designed for maintenance and drainage.

3.09 BACKFLOW PREVENTION: Protect plumbing fixtures, faucets with hose connections, and other equipment having plumbing connection, against possible back siphonage.

3.10 PLUMBING FIXTURE INSTALLATION: Caulk wall and floor mounted plumbing fixtures watertight where the plumbing fixtures are in contact with walls and floors. Caulk deck-mounted trim at the time of assembly, including fixture and casework mounted. Caulk self-rimming sinks installed in casework.

3.11 SYSTEMS FLUSHING: The Contractor shall fill all piping systems with water and drain these systems before they are placed in operation, in order to remove foreign materials that may have been left on or deposited in the piping systems during installation.

3.12 TESTING:

- A. The Contractor shall provide personnel and equipment, arrange for and pay the cost of all required tests and inspections required by, and in the presence of the local jurisdiction. Piping shall NOT be concealed until it has been inspected and approved.
1. Domestic Water: 150 psi hydrostatic pressure for four (4) hours.
 2. Fuel Gas: 60 psi air for 60 minutes.
 3. Soil and Vent System: The drainage systems shall be tested and proved tight under a water pressure test with nipples, ferrules, connections and water closet bends being in place.
 - a. Water tests shall be applied to the drainage systems either in total or in sections. If the system is tested in sections, all openings shall be tightly plugged except at the highest point of the section being tested. The water shall be kept in the system or in the portion under test for at least 15 minutes before inspection. Each section shall be filled with water, but no section shall be tested at less than a 10-foot water head. In testing successive sections, at least the upper 10 feet of the previously tested adjacent section shall be tested, so that no joint or pipe in the building shall have been tested by less than a 10 foot water head.
 - b. After all plumbing fixtures have been set and their traps filled with water, their connections shall be tested and proved gas and watertight.
 4. Pipes or joints which leak shall be taken apart and work re-done; no surface-applied caulking is permitted as corrective work.

3.13 WATER PIPING STERILIZATION:

- A. The Contractor shall notify the PETCO Project Manager prior to commencing Water Piping Sterilization; Water Piping Sterilization must be completed prior to the Date of Final Completion.
- B. Water Piping Sterilization Process: After the domestic water piping has been pressure tested, the entire system shall be thoroughly sterilized per the requirements of the health department having jurisdiction; or if there are no requirements, the entire system shall be sterilized with a sterilization solution containing not less than 100 parts per million of available chlorine. The sterilization solution shall be either liquid chlorine; or U.S. Army Spec. 4-1; or calcium hypochlorite; or chlorinated lime conforming to Fed. Spec. O-C-114, and shall be introduced into the system in accordance with Federal Regulations. The sterilization solution shall be allowed to remain in the system for 24 hours, during which time all valve and faucets shall be opened and closed several times. After the sterilization solution has been applied for 24 hours, the Contractor shall test for residual chlorine at the ends of the lines. If less than 5 parts per million is indicated, then the Contractor shall repeat the sterilization process. After sterilization is complete, the sterilization solution shall be flushed from the system with clean water, until the residual chlorine content is less than 0.2 parts per million.
- C. After completion, the Contractor shall provide a Certificate Of Performance in the Building Maintenance Manuals (refer to Section 01700-Contract Closeout) stating the system capacity; the disinfectant used; the time and rate of disinfectant applied; and residuals, in parts per million at completion of the Water Piping Sterilization Process.

- D. PETCO may test the water at any time prior to the Date of Final Completion, and if found bacteriologically unsafe, the Contractor shall re-chlorinate the system until the water is proven acceptable.
- 3.14 PAINTING: All exposed overhead plumbing piping and supports, suspended from the exposed structure, shall be dry-fall painted to match the adjacent, painted, exposed structure per Section 09900-Painting.

END OF SECTION

