SECTION 22 05 00

COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Pipe expansion compensators
3. Dissimilar materials
4. Transition fittings.
5. Dielectric fittings.
6. Unions.
7. Piping systems-common requirements.
8. Piping joint construction.
9. Piping connections.
10. Equipment installation requirements common to equipment sections.
11. Painting and finishing.
12. Concrete bases.
13. Supports and anchorages.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. CPVC: Chlorinated polyvinyl chloride plastic.
3. PE: Polyethylene plastic.
4. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Transition fittings.
2. Dielectric fittings.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BCUP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded. H. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.

H. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.4 PIPE EXPANSION COMPENSATORS

A. Any breaks or damage to the piping system or to the Work of other Sections within the period of the guarantee due to improper provision for expansion and contraction must be replaced at this Contractor's expense.

B. This Contractor is to provide for expansion of pipes by providing expansion loops and shall provide anchors at pump discharge and suction lines. All expansion loops shall be prestressed.

C. Make adequate provisions for proper expansion and contraction of piping. At connections of branches to water mains, risers and at connections to heaters, and other equipment, provide sufficient number of elbow swings to allow for proper expansion and contraction of piping. Provide adequate elbow swings, expansion compensators, expansion loops, wherever noted, indicated, or required to allow for proper expansion and contraction of mains and risers.

2.5 DISSIMILAR METALS

A. Connections between pipe, fittings, hangers and equipment of dissimilar metals shall be avoided.

B. Dielectric unions or insulated couplings shall be installed between copper or brass piping material and steel piping material, and valves. Unions or insulated couplings shall be used for pipe sizes 2" and smaller, and use dielectric gaskets on flanges and sleeves for pipes 21/2" and larger.

C. Pipes, fittings, hangers, etc., of dissimilar metals shall be insulated against direct contact with each other by using a high quality or grade of dielectric insulating material.

D. Watts Model No. 3000 or approved equal

2.6 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

1. Manufacturers:

   a. Cascade Waterworks Mfg. Co.
   b. Dresser Industries, Inc.; DMD Div.
   c. Ford Meter Box Company, Incorporated (The); Pipe Products Div.
   d. JCM Industries.

   e. Smith-Blair, Inc.
   f. Viking Johnson.

2. Underground Piping NPS 1-1/2 (DN 40) and Smaller: Manufactured fitting or coupling.
3. Underground Piping NPS 2 (DN 50) and Larger: AWWA C219, metal sleeve-type coupling.
4. Aboveground Pressure Piping: Pipe fitting.

2.7 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

1. Manufacturers:

a. Capitol Manufacturing Co.
b. Central Plastics Company.
c. Eclipse, Inc.
d. Epco Sales, Inc.
e. Hart Industries, International, Inc.
f. Watts Industries, Inc.; Water Products Div.
g. Zurn Industries, Inc.; Wilkins Div.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

1. Manufacturers:

a. Capitol Manufacturing Co.
b. Central Plastics Company.
c. Epco Sales, Inc.
d. Watts Industries, Inc.; Water Products Div.

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, fullface- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Manufacturers:

a. Advance Products & Systems, Inc.

b. Calpico, Inc.
c. Central Plastics Company.
d. Pipeline Seal and Insulator, Inc.

2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig (1035- or 2070-kPa) minimum working pressure where required to suit system pressures.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

1. Manufacturers:

a. Calpico, Inc.
b. Lochinvar Corp.

G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

1. Manufacturers:

a. Perfection Corp.
b. Precision Plumbing Products, Inc.
c. Sioux Chief Manufacturing Co., Inc.
d. Victaulic Co. of America.

2.8 UNIONS

A. Unions 2" and smaller shall be threaded. Unions 21/2" and larger shall be flanged.

B . Threaded unions on copper or brass pipe shall be brass, ground joint suitable for 300 pounds W.S.P.

C. Threaded unions on steel pipe, unless otherwise specified, shall be of malleable iron with bronze ground seats suitable for 300 pounds W.S.P.

D. Flanged unions shall be cast iron for steel pipe, and brass for copper or brass pipe, gasket type suitable for 150 pounds W.S.P.

E. Flanged unions shall be provided with the necessary steel bolts, nuts and gaskets.

F. All unions used on galvanized piping shall be galvanized.

G. All unions used on chromium plated piping shall be chromium plated.

H. Unions shall be used to connect equipment (pumps, circulators, tanks, meters, etc.) to water lines. The union shall be installed as close to the equipment as practical. Where valves are adjacent to equipment, union shall be on down stream side of valves.

I. Unions shall be as manufactured by

Anvil International
NIBCO Inc.
Ward Manufacturing LLC
The Viking Corporation.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

M. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.

N. Verify final equipment locations for roughing-in.

O. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.

3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
5. PVC Non pressure Piping: Join according to ASTM D 2855.
6. PVC to ABS Non pressure Transition Fittings: Join according to ASTM D 3138 Appendix.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

K. Plastic Non pressure Piping Gasketed Joints: Join according to ASTM D 3212.

L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.5 PAINTING AND FINISHING

A. Painting of plumbing systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.6 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use [3000-psi (20.7-MPa)] 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "[Cast-in-Place Concrete]."

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment. C. Field Welding: Comply with AWS D1.1.

3.8 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor plumbing materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

END OF SECTION 22 05 00

SECTION 22 05 10

PLUMBING EQUIPMENT, SPECIALTIES AND ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section is to coordinate with and be complementary to the General Conditions, General Requirements and Supplemental General Requirements, wherever applicable to Mechanical and Electrical Work.

B. Section 21 00 00 - Special Requirements for Mechanical and Electrical Work shall apply.

C. Section 22 05 00 – Common Work Results for Plumbing shall apply.

1.2 SCOPE OF WORK

A. The Work of this Contract includes providing all labor, material, equipment, accessories, services, and tests necessary to complete and make ready for operation by the Owner, all work as shown on the Drawings and hereinafter specified.

PART 2 - PRODUCTS

2.3 TRAPS

A. Each fixture and piece of equipment requiring connection to the drainage system shall be separately trapped by means of a water seal trap placed as close to the fixture as possible.

B. All running traps on drains, etc., shall have inlet handhole cleanouts and brass plug cleanouts in bottom. Cast iron traps below grade shall have bottom plug omitted. All exposed P traps shall have bottom cleanouts and shall be chromium plated brass.

A. Pipes, fittings, hangers, etc., of dissimilar metals shall be insulated against direct contact with each other by using a high quality or grade of dielectric insulating material. D. Watts Model No. 3000 or approved equal.

2.8 AIR CHAMBERS (NOT USED)

2.9 WATER HAMMER ARRESTERS (SHOCK ABSORBERS)

A. Provide engineered water hammer arresters where required and/or shown on the Drawings. Engineered water hammer arresters shall conform to Plumbing and Drainage Institute Standard PD1-WH201 and ASSE Standard 1010. They shall be sized and installed in accordance with manufacturer's instructions. Engineered water hammer arresters by Josam, J. R. Smith, Zurn, Sioux Chief, MIFAB, Wilkins, Wade and Watts, Quiet Pipes by Oatey and FNW, Fig X10P & X11P will be accepted.

2.10 HOSE BIBBS (NOT USED)

2.11 WALL HYDRANTS (NOT USED)

2.12 THERMOMETERS

A. Thermometers shall be adjustable angle type with red reading mercury, 7" black baked enamel case, black on white scale, a range from 30°F. to 240°F, and a separable brass socket. Thermometers shall be so installed and adjusted that they are easily readable from a normal standing ,position on the floor. Thermometers shall be similar or approved equal to U.S. Gauge "Multi-Angle".

2.13 PRESSURE GAUGES

A. Pressure gauges shall have 3-1/2" diameter black enamel cast aluminum case with threaded brass ring, heavy glass, phosphor bronze bushed, rotary precision movement and dial ranges of 0 to 100 psi for water service. Pressure gauges shall be similar or approved equal to Trerice Co. No. 500X, with brass tee handle cock.

2.14 VACUUM BREAKERS

A. Provide vacuum breakers on water supply piping to each fixture and piece of equipment with submerged inlets, and on faucets and outlets within the building to which hoses can be or are attached. Set vacuum breakers in exposed readily accessible locations and at least 6'-6" above finished floor. Vacuum breakers shall be chrome plated brass, T&S Brass No. B-929-A or approved equal.

2.15 HOT WATER MIXING VALVE STATION

A. Valves shall be a 3-way self-actuating type, with bronze body. Unit shall be complete with valve stem lubricator, copper bulb and flexible tubing with protective sheathing and shall be adjustable, Lawler Series 66, valve No. 66-125 or approved equal. For valve size and outlet temperature, refer to Drawings.

2.16 FIXTURE STOPS

A. Provide fixture stops as manufactured by the Dole Valve Company or approved equal. Fixture stops are to be installed in accordance with the manufacturer's recommendations and shall be provided for all sinks, lavatories and electric water coolers.

B. All Lavatories: Dole Model #FMA 3/8" male pipe inlet and 3/8" female pipe outlet for rigid hot and cold supply risers. Flow rate 0.5 gpm.

C. All sinks including equipment with sinks, mop receptors, service sinks and kitchen sinks, showers shall be Dole Model #FMC male pipe inlet and 1/2" female pipe outlet for hot and cold supply risers. Flow rate 4 gpm for service sinks and mop receptors, 3 gpm for kitchen and casework sinks, 2.5 gpm for showers.

D. Electric Water Coolers: Dole Model #F3/4C male pipe inlet and 3/8" female pipe outlet for cold supply riser. Flow rate 0.5 gpm.

E. All exposed-to-view fixture stops and related piping shall be chrome plated nickel, or nickel plated.

2.17 DRAINS

A. Drains shall have heavy cast iron, with double drainage flange and weep holes, with outlet connections as indicated and of sizes indicated on Drawings. Drains (except as noted) shall be furnished with high polished brass tops consisting of a one-piece rim secured to the body and vandal-proof spanner type screws, and a solid brass grate with reinforcing members on underside. Removable sediment basket shall be of heavy duty one-piece construction as specified hereinafter. All strainers or grates shall be secured with vandal-proof spanner type screws, unless otherwise specified.

B. All drains in floors with a waterproof membrane shall be equipped with 6 lb. lead flashing or 20 oz. soft rolled sheet copper and secured to the flashing flange with brass bolts and cast iron clamping device. Flashings shall bond not less than 1 '-0" on all sides into membrane waterproofing.

C. Set all drains in such a way that the floor finish and top of the drain will be plumb and flush with finish floor without requirements for future additional extension, modifications, etc.

D. When Dex-O-Tex and/or vinyl waterproof floor is indicated on the Architectural Drawings, -all drains must be provide with required flanges.

E. All drains, except as noted, shall be similar to or equal to Zurn Mfg. Co. and shall be as follows:

1. Floor Drain F.D. (All areas) — Shall be Wade Model No. 1120 NH or approved equal, where indicated on the Drawings.

2. Floor Drain F.D. (Equipment Rooms) — Shall be Wade shallow floor drain Model No. 1200 TI) or approved equal.

2.18 CLEANOUTS

A. Provide easily accessible cleanouts where indicated; at base of vertical stacks and leaders, at ends of horizontal drainage lines and at intervals not exceeding 50 ft., at each change of direction, on hand holes of running traps, and where indicated to make entire drainage system accessible for rodding. Provide at least 18 inch clearance to permit access to cleanout plugs.

B. Cleanouts for cast iron pipe shall consist of tapped extra heavy cast iron ferrule caulked into cast iron fittings, and extra heavy brass screw plug with solid hexagonal nut.

C. Cleanouts turning out through walls and up through floors shall be made by long sweep ells of "Y" and 1/8 bends with plugs and face or deck plates to conform to architectural finish in room. Where no definite finish is indicated on the Architectural and/or Mechanical Drawings, wall plates shall be chrome plated cast brass and floor plates shall be nickel bronze. Screws in cleanouts in finished areas shall be vandal-proof.

D. Cleanouts shall be full size at the pipe up to and including 6 inch pipe. On larger size piping, 6 inch size plugs shall be used.

E. The following schedule indicates the various types of cleanouts desired at various locations indicated on the Drawings. These cleanouts have been selected from the catalog of Zurn and are representative of quality design and finish desired. Cleanouts of Josam Mfg. Co., or J.R. Smith may be submitted provided they meet Specifications fully in every respect (such as material, weight, clamping features, finish, etc.).

F. The characteristics and quality of the cleanout shall be as follows.

1. Cleanout fitting in vertical stacks shall consist of tapped tees, capable of receiving a rough brass raised head cleanout plug; Zurn 1460-8.

2. Cleanouts in Mechanical Equipment Rooms shall be Zurn 1420-25.

3. Cleanouts in finished areas shall be Zurn Z-1420-3 or Z-1420-7 with recess for tile floors.

4. Cleanouts in Dex-O-Tex waterproof floors shall be Zurn No. Z-1405-18 with extra heavy duty top.

5. Cleanouts for 3 or more fixtures piped horizontally shall be extended to wall cleanouts, and shall be Zurn No. Z-1470.

6. All cleanout plugs shall be brass and lubricated with graphite before installation.

2.19 CLEANOUTS

A. Provide a submersible sump pump and controllers for same that preclude oil from oil laden waste water from discharging into the drainage system. The oil containment system, sump pump and other accessories, for controlling inadvertent oil discharge into the sewer lines shall function automatically and shall allow for water to be pumped from the elevator pit and to stop flowing upon detection of any trace of oil. The system shall include an alarm and LED lights that shall provide a

warning in the event of: (a) the presence of oil in the pit and (b) high water level condition. In addition, LED lights shall indicate: (1) power to the motor and (2) pump run function. Provide alarms with separate and distinct sounds for: high water level situation, presence of oil in the pit, power on and pump run function. The warning signal shall be delivered to the Indicator Panel of the Auxiliary Signal System. Refer to section 16701. Also provide liquid level sensors for signaling "high water level alarm".

B. The pump shall be similar to Stancor effluent submersible type, model #SE50. The pump shall be approved to UL 778 standards and shall include thermal and overload protection. The motor shall be rated ½ H.P., 3 phase, 230V and capable of operating continuously or intermittently. The motor housing shall be constructed of #304 stainless steel and mechanical seats shall be housed in a separate oil-filled compartment. The pump shall be placed in a concrete pit for which a frame and split cover shall be provided. The cover shall be of 5/16" steel checkered plate drilled for installation of the pump, oil-minder probe and float guide.

C. Provide 2"x2"x1/4" angle iron frame and a 5/16" split, hot-dip galvanized, steel grating sump pit cover. The cover shall have all required openings for pump and piping including power cable and mounting hardware. Submit for approval shop drawings of pump, frame and pit cover before installation. The General Construction Subcontractor will install the angle frame and cover when the sump pit is poured.

D. Provide 2" check valve manufactured by Stancor and connect discharge piping to the building drainage system via an air gap or an air break.

E. The main control shall be approved to UL 508 and housed in a gasketed NEMA 4X enclosure with a see-through window for observation of operating functions. The control panel shall come equipped with an 8-pin twist lock receptacle, dual solid state Oil-Minder relays with variable sensitivity settings, an over current relay, self-cleaning stainless steel sensor probe, high decibel warning horn with alarm silencing switch, dual floats, clearly marked terminal board and remote monitoring contact. A NEMA 4X junction box with 8-pin twist-lock electrical receptacle and mating 8-conductor cable shall be provided. The 8-conductor cable shall be extended via a 2" electrical conduit for final connection to the twist lock outlet that is integral to the control panel. The control unit, junction box, pump, floats and sensor shall be factory assembled as a complete, ready-to-use system and shall be tested and approved as a complete system by a nationally recognized testing laboratory. The system shall allow for the main control to be located outside of the elevator hoistway to be monitored for all functions without having to enter the elevator shaft.

F. Approved Manufacturer: Stancor Inc., Multi-Option Oil Minder system

G. Provide stainless steel screws for all anchoring and nailing of pit cover and angle frame

PART 3 - EXECUTION

3.1 SERVICES TO FIXTURES AND EQUIPMENT FURNISHED UNDER OTHER SECTIONS

A. The list of equipment for the project shall be reviewed by this Contractor, who shall include in the Contract price the costs for installing all equipment as herein specified and as claimed by the Trade Unions as Plumbing Work.

B. Refer to Architectural and Plumbing Drawings for exact locations of equipment and fixtures. Provide all materials, equipment and appliances necessary and required to complete all work, including but not limited to the following: plumbing, roughing and final connections, valves, stops, trim, escutcheons, fittings, traps, etc.

C. Unless otherwise detailed on Drawings, roughing of proper size and capacity for equipment indicated on Architectural, Heating and Ventilation, Plumbing or Electrical Drawings or provided under another Division or Section shall be provided and installed in such a manner and location that final connection can be made with a minimum of work and without cutting, patching permanent walls, partitions, ceilings or floors. Drawings are of necessity, schematic, for special equipment as exact roughing and requirements may vary with different manufacturers.

3.2 INSTALLATION REQUIREMENTS

A. The Contractor shall make all plumbing connections to all equipment and fixtures requiring such connections as shown on Drawings whether the equipment and fixtures are furnished under this Section or another Division or Section. Investigate the equipment furnished under other Divisions or Sections to determine if combination fittings have a means of shut-off or require the installation of check valves, backflow preventors and/or pressure reducing valves. Make final connections to such, including installations of all special traps, supplies, control valves, etc. furnished with such equipment, and furnish all material necessary that is not supplied with the equipment. Seal all pipe penetrations thru wall or floor.

B. The Contractor shall leave valved water connection for equipment, spaces and other locations where shown for the use of other trades or other Sections. On each valved outlet for equipment with submerged inlets, provide a backflow preventor after the shut-off valve. Funnel drains and/or floor drains for the air conditioning, heating and refrigeration work shall be provided.

C. Fixture supplies and traps as specified, shall be chrome plated brass where exposed to view. Where concealed from view in cabinets, etc., they may be rough brass. All fixture supplies shall have stops.

D. As soon as installed, all metal fixture trimming shall be thoroughly covered by this Contractor with non-corrosive grease which shall be maintained until all construction work is completed.

E. Upon the completion of the Work, all fixtures and trimmings shall be thoroughly cleaned and polished and free from all marks and left in first-class condition.

F. Upon completion of the Work, test flush valves and faucets for leaks or drips and adjust same for quiet operation.

G. All fixtures shall be left thoroughly clean. All plated or polished fittings, pipes and appliances shall be coated with Vaseline immediately after installation, and shall be finely polished and free from all marks and foreign substances.

H. Equipment and all connections shall be in accordance with the rules relative to submerged inlets and shall be provided with all necessary vacuum breakers and check valves in accordance with the applicable codes.

I. Connection between any fixture with a floor outlet and flange shall be made with an approved prepared gasket that shall be a germicide, absolutely gas and fume-proof, watertight, stainproof, containing neither oil nor asphaltum, and which will not rot, harden or dry under any extreme climate change and must adhere on wet surfaces.

J. Each fixture shall be separately trapped, using the type and size of trap called for specifically in the Specifications or the type required by the Plumbing Code. The traps shall be approved type.

K. All fixtures requiring hot and cold water shall have the cold water faucet on the right hand side of the fixture and the hot water faucet on the left hand side of fixture.

L. The Contractor shall be responsible for protecting all plumbing fixtures, equipment, etc., provided under Plumbing Work Sections against injury from building materials, acids, tools and equipment.

M. No slip joints will be permitted on water piping.

N. Flexible supplies will not be permitted in lieu of rigid supplies.

Double complaint sinks or lavatories shall be provided with faucet, trap, supplies, etc. for each compartment.

END OF SECTION 22 05 10

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SECTION 22 05 17

SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section is to coordinate with and be complementary to the General Conditions, General Requirements and Supplemental General Requirements, wherever applicable to Mechanical and Electrical Work.

B. Section 21 00 00 - Special Requirements for Mechanical and Electrical Work shall apply.

C. Section 22 05 00 – Common Work Results for Plumbing shall apply.

1.2 SCOPE OF WORK

A. The Work of this Contract includes providing all labor, material, equipment, accessories, services, and tests necessary to complete and make ready for operation by the Owner, all work as shown on the Drawings and hereinafter specified.

1.3 SUMMARY

A. Section Includes:

1. Sleeves.
2. Stack-sleeve fittings.
3. Mechanical sleeve seals.
4. Sleeve-seal fittings.
5. Grout.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

2.2 STACK-SLEEVE FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

i Smith, Jay R. Mfg.Co.
ii Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
iii Metraflex.
iv Or Approved equal.

B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.
1. Underdeck Clamp: Clamping ring with setscrews.

2.3 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Manufacturers:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Metraflex Co.
d. Pipeline Seal and Insulator, Inc.

e. Or approved equal

2. Sealing Elements: [NBR] interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: [Carbon steel]. Include two for each sealing element.
4. Connecting Bolts and Nuts: [Carbon steel with corrosion-resistant coating] of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.4 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting,nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPE SLEEVES

A. Any pipe required in walls and floors shall be provided with a pipe sleeve.

B. Provide watertight sleeves for all pipes penetrating exterior foundation walls and waterproof floor areas and where other waterproof areas are noted on the Architectural and Structural Drawings.

C. Except where indicated or specified otherwise, provide and install Schedule 40 galvanized steel sleeves for all piping passing through concrete walls or floor slabs. Sleeves shall be securely set in the framework and where not specified otherwise shall be of such length as to extend flush with each face of the wall in which they are installed. Sleeves shall be securely set in floors 3" above unfinished floor and 2" above the finished floor or tile, as applicable. Sleeves in kitchen and laundry areas shall be chrome plated.

D. Sleeves shall have an internal diameter of at least 1" larger than the outside pipe size diameter of the pipe passing through them. Sleeves in exterior foundation walls shall be James B. Clow and Sons, No. F-1430 or F-1435, or approved equal, extra-heavy cast iron wall sleeves with intermediate integral flange. Cast iron sleeves shall be set with ends flush with wall faces.

E. Where sleeves penetrate waterproofing, install caulking between pipes and pipe sleeves as follows:

1. Pack oakum to a depth of 1" between pipe and pipe sleeve at a location permitting 3" of sealant to be installed above the oakum.

2. Fill space above oakum to a depth of 3" with sealant similar and equal to Igas Joint Sealer as manufactured by Silka Chemical Corporation.

3. All waterproof piping penetrations shall have mechanical seals.

F. Sleeves for gas piping shall extend 4 inches beyond exterior face of wall and 1 inch beyond inner face.

G. Sleeves for gas piping through exterior walls and floor slabs on earth shall be as specified and approved by the gas company

H. Sleeves in waterproof floors shall be as manufactured by Zurn Inc. or equal, cast iron sleeve with integrally cast flange and flashing device.

I. Sleeves are not required for core-drilled holes.

J. Permanent sleeves are not required for holes formed by removable PE sleeves.

K. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

L. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

   a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
3. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

   a. [Steel] Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).
   b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger, penetrating gypsum board partitions.

   c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.

      1) Seal space outside of sleeve fittings with grout.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.

M. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

N. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.2 STACK SLEEVES

A. Stack sleeves for pipes passing through roof shall be equal to Zurn Z-195-10, with cast iron body, adjustable flashing ring, rust resistant bolts, and under deck clamp. The adjustable flashing ring shall be caulked after it is in the proper position. The space between the flashing sleeve and the pipe passing through same shall be caulked watertight.

3.3 GROUTING

A. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 22 05 17

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SECTION 22 05 18

ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section is to coordinate with and be complementary to the General Conditions, General Requirements and Supplemental General Requirements, wherever applicable to Mechanical and Electrical Work.

B. Section 21 00 00 - Special Requirements for Mechanical and Electrical Work shall apply.

C. Section 22 05 00 – Common Work Results for Plumbing shall apply.

1.2 SCOPE OF WORK

A. The Work of this Contract includes providing all labor, material, equipment, accessories, services, and tests necessary to complete and make ready for operation by the Owner, all work as shown on the Drawings and hereinafter specified.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: [Polished chrome-plated and rough brass].

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: [Polished chrome-plated and rough brass].

E. One-Piece, Stamped-Steel Type: With [set screw or spring clips] and chrome-plated finish.

F. Split-Plate, Stamped-Steel Type: With [concealed] hinge, [set screw], and chrome-plated finish.

G. One-Piece, Floor-Plate Type: Cast-iron floor plate.

H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

I. The Contractor shall provide escutcheons on all exposed pipe wherever they pass through floors, ceilings, walls or partitions.

J. Escutcheons for pipes passing through outside walls and floors shall be Ritter Pattern and Casting Co., No. 1 or Carpenter & Paterson, Inc, solid, cast brass, flat type secured to pipe with set screws

K. Escutcheons for pipes passing through interior walls, partitions, and ceilings shall be Ritter Pattern and Casting Co., No. 1 or Kohler or Zurn or McGuire Mfg. Co, solid, cast brass chromium plated type, secured to pipe with set screws.

L. Escutcheons for pipes in unfinished areas shall be cast iron, secured with set screws.

PART 3 - EXECUTION

3.1 ESCUTCHEONS

A. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
c. Insulated Piping: One-piece, stamped-steel type with spring clips.
d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast brass type with polished chrome-plated finish.
e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
f. Bare Piping at Ceiling Penetrations in Finished Spaces [One-piece or split casting], cast-brass type with polished chrome-plated finish.
g. Bare Piping at Ceiling Penetrations in Finished Spaces [One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge] and set screw.
h. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with [polished chrome-plated] finish.
i. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type with [concealed or exposed-rivet] hinge and [set screw or spring clips].
j. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
k. Bare Piping in Equipment Rooms: One-piece, stamped-steel type with [set screw or spring clips].
l. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

END OF SECTION 22 05 18

SECTION 22 05 23

GENERAL DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section is to coordinate with and be complementary to the General Conditions, General Requirements and Supplemental General Requirements, wherever applicable to Mechanical and Electrical Work.

B. All components in potable water systems intended to dispense water for human consumption, including but not limited to piping, pipe fittings, valves, solder, flux, drinking fountains, plumbing fixtures, plumbing fixture trim, shall comply with the "Reduction of Lead in Drinking Water Act", Federal Public Law 111-380 to comply with allowable lead content. The respective component specifications shall include the wording "Lead free or low lead" and reference the need to comply with NSF/ANSI 372, NSF 61 Annex G or California AB 1953

C. Section 21 00 00 - Special Requirements for Mechanical and Electrical Work shall apply.

D. Section 22 05 00 – Common Work Results for Plumbing shall apply.

1.2 SCOPE OF WORK

A. The Work of this Contract includes providing all labor, materials, accessories, services and tests necessary to install complete and make ready for operation by the Owner, all work as shown on Drawings and as specified hereinafter.

1.3 CODES AND STANDARDS

A. The contractor shall install items that are certified as lead-free as defined in the 2011 Reduction of Lead in Drinking Water Act.

1. The law makes it unlawful for any person, including a Contractor, to introduce into commerce any pipe, pipe fitting, plumbing fixture, faucet that is not lead free.
    a. "Lead free" content is intended to mean not more than 0.2% lead when applied in connection to solder and flux and not more than 0.25 percent of the weighted average of lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fixtures and faucets.

b. The section of the federal act that applies to solder and flux, 0.2% lead content, went into effect back in August of 1998; and for the most part soldering product being sold in today's market complies with the law.

c. The requirement for .25% weighted average of lead when applied to the wetted surfaces of pipes, pipe fittings, plumbing fixtures and faucet is the new section of the law that requires special attention from a contractor.

2. To ensure compliance with "Reduction of Lead in Drinking Water Act", a procedure for determining lead content was developed. The calculation procedure works as follows:

a. "For each wetted component, the percentage of lead in the component shall be multiplied by the ratio of the wetted surface area of that component to the total wetted surface area of the entire product to arrive at the weighted percentage of lead of the component. The weighted percentage of lead of each wetted component shall be added together, and the sum of these weighted percentages shall constitute the weighted average lead content of the product. The lead content of the material used to produce wetted components shall be used to determine compliance with paragraph 1.a. above

b. As an alternative to implementing the lead content calculation, the contractor may choose to demonstrate compliance with the act by requiring from manufacturer documentation certifying that products are lead-free based on either calculation or tests or third party certification.

1.4 SPECIAL REQUIREMENTS

A. Furnish all valves as indicated on the plans, or as may be required for the proper control of the pipe lines installed under these Specifications, so that any fixture, line or piece of apparatus may be cut out for repair without interference or interruption of the service to the rest of the building. All water valves shall have a minimum working pressure of 125 psi, and shall be water rated unless otherwise noted on the Drawings or specified herein. All valves shall be of one manufacturer.

B. Drain valves shall be 3/4" heavy cast brass with composition washers with male thread for hose connections.

C. At the high point of the hot water piping system provide a 1/2" automatic IBBM air relief valve, 125 PSI, WOG Class. Pipe drain to spill over adjacent floor drain or service sink.

D. All valves shall have the trademark of the manufacturer and the guaranteed working pressure cast or stamped on the body of the valve. All shall be of one manufacturer.

PART 2 - PRODUCTS

2.1 EXTERIOR, FIRE PROTECTION VALVES (NOT USED)

2.2 EXTERIOR WATER SERVICE VALVES (NOT USED)

2.3 INTERIOR PIPING SYSTEM VALVES

A. Maximum content of lead permitted in materials used in the manufacture of valves shall be .25%.

B. All valves shall be designed for packing under pressure with valve open or closed.

C. All valves up to 2" in diameter shall have threaded or solder ends, 2½" in diameter and over shall have flanged ends.

D. Iron body flanged-valves, strainers and other items shall be provided with gaskets and sealing as manufactured by Garlock. All flanges shall be drilled for American Standard Association 125-pound standard.

G. Ball valves shall be two-piece, full port, 600 W.O.G., bronze body, chrome plated bronze or brass ball and Teflon seals, with thread or solder ends. Ball valves shall have a lever handle, provide stem extensions for ball valves used in insulated piping. Threaded ends ball valve shall be Conbraco Industries, Inc.; Apollo Valves 77CLF-100, Crane 9211, Milwaukee UPBA-400, Hammond UP8301, NIBCO T-585-80-LF, and soldered ends ball valve shall be Conbraco Industries, Inc.; Apollo Valves 77CLF-200, Milwaukee UPBA-450, Hammond UP8311, NIBCO S-585-80-LF. Ball valves should be used for up to 2" sizes only.

1. Press-Fit Ball Valves: Valves shall be two-piece bronze body with full port, chrome or brass plated ball, blow-out proof stem and PTFE or RTFE seats, rated at 200 psi with press fitting ends. Ball Valves shall be Viega Model 2971.1ZL, NIBCO C585-80-LF, Conbraco Industries, Inc.; Apollo Valves 77WLF, Milwaukee UPBA400-P2. Ball valves shall have a metal lever handle.

H. Soldered end valves shall be joined using “soft” soldering.

I. Drain valves shall be similar to Crane #117 or equal.

2.4 BACKFLOW PREVENTERS (NOT USED/EXISTING BFP)

2.5 BALANCING VALVES

Provide balancing valves for hot water circulating where shown on the Drawings, balancing valves to be calibrated as per manufacturer's recommendations. For ease of installation, a balancing valve assembly with drainage option fabricated at the factory and consisting of balancing, isolation and in-line check valves in lieu of separate balancing valves with other

accessories will be accepted. Balancing valve assembly shall be constructed as is required for individual balancing valves and shall be of brass or bronze material for up to 2". For 2½" and above, valve's construction shall be cast-iron or ductile-iron with PTFE or EPDM seat and have differential pressure read-out ports across valve seat area. Valves bodies shall have tapped drain/purge port. Valves to have memory stop feature and calibrated name plate to assure specific valve setting. Valve to be leak-tight at full rated working pressure. Valves to be manufactured by Bell and Gossett New Circuit Setter Plus Model CB, Tour & Anderson Model STAS, Grinnell Model CB800 by Tyco, Watts CSM-61-M1 or Wheatly Gaso Globe Style Circuit Balancer, Model TRAB-Q by Jomar.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. The entire plumbing system shall be supplied with valves so located, arranged and operated as to give a complete regulating control to all fixtures and apparatus.

B. Provide line size shut-off valve as shows on the drawings and at locations required for proper operation, servicing, and troubleshooting of domestic water distribution systems and connected components. Locations shall include but not limited to the following.

1. At each fixture and piece of equipment
2. At each branch take-off from mains
3. At the base of each riser
4. At each battery of fixtures
5. At strategic locations to provide sectional isolation of distribution without disrupting services to larger portions of the systems.

C. Install check and balancing valve on downstream side of the shut-off valve on hot water circulating riser and branch lines.

D. Valves, where exposed and used in connection with finished piping, shall have the same finish as the pipe.

E. Provide drain valves at the heel of each plumbing water riser and at low points of the horizontal mains.

F. Provide chain operators on all valves 4" and larger located 7'-0" and higher above floor.

G. Provide shut-off valves, check valves and balancing valve on each pump discharge line.

H. All valves used on branch piping to bathroom and kitchens shall be all bronze type ball valves with discs suitable for service to which they are connected.

I. Install valves where required for proper operation of piping and equipment, including valves in branch lines necessary to isolate sections of piping. Locate valves so as to be accessible.

J. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward unless unavoidable. Install valve drains with hose-end adapter for each valve that must be installed with stem below horizontal plane.

K. Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.

L. Install valves with bodies of metal other than cast iron where thermal or mechanical shock is indicated or can be expected to occur.

M. Except as otherwise indicated install ball valves to comply with ANSI B31.1. Where throttling is indicated or recognized as principal reason for valve, install globe valves.

N. Limit selection and installation of valves with non-metallic discs to locations indicated and where foreign material in piping system can be expected to prevent tight shut-off of metal seated valves.

O. Select and install valves with replaceable seats, except where otherwise indicated.

P. All valves shall have the name or trademark of the manufacturer and guaranteed working pressure cast or stamped on the body of the valve. All flanges shall be drilled for American Standards Association 125-pound Standard.

END OF SECTION 22 05 23

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SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section is to coordinate with and be complementary to the General Conditions, General Requirements and Supplemental General Requirements, wherever applicable to Mechanical and Electrical Work.

B. Section 21 00 00 - Special Requirements for Mechanical and Electrical Work shall apply.

C. Section 22 05 00 – Common Work Results for Plumbing shall apply.

1.2 SCOPE OF WORK

A. The work of this Contract includes providing all labor, materials, accessories, services and tests necessary to install complete and make ready for operation by the Owner, all Hangers and Supports for Plumbing and Fire Protection Systems as shown on the Drawings and as specified hereinafter.

1.3 SUBMITTALS

A. Submit catalog cuts for each different type of hanger and rod, support and accessory.

B. Submit method of support and hanging for Engineers approval prior to installation.

1.4 SPECIFIC REQUIREMENTS

A. Provide products which are Underwriters Laboratories listed and Factory Mutual approved.

B. Provide pipe hangers and supports of which materials, design, and manufacture comply with ANSI/MSS SP-58.

C. Select and apply pipe hangers and supports, complying with MSS SP-69.

D. Fabricate and install pipe hangers and supports complying with MSS SP-89.

E. Assume the responsibility for the proper transfer of the loads of the piping system to the structure. No additional cost to the Owner should be expected for any corrective work during construction.

F. Supports and hangers shall be provided for all horizontal and vertical piping. The hanger design shall conform to the ASA Code for Pressure Piping. Hangers shall be kept outside of pipe insulation.

G. All bracket clamps and rod sizes indicated in these Specifications are minimum size only. This Contractor shall be responsible for structural integrity of all supports. All structural hanging material shall have a safety factor of five (5) built in.

H. All horizontal cast iron pipe shall be supported every five (5) feet and at each hub and/or "nohub" clamping assembly. When a concentration of fittings occurs, additional support shall be installed consistent with good trade practices. "No-hub" system must be supported in accordance with Standard CISPI-310-78.

I. Any pipe penetrating the foundation wall shall be provided with a water tight sleeve with link seal

1.5 HANGERS AND SUPPORTS

A. Pipe supports shall be of the following type and figure number, manufactured by C&P, F&M, Grinnell, or equal as approved:

B. Pipe Hanger Schedule

	C&P	F&M	Grinnel
Beam Clamp	268	282	
Clevis Hanger	100	239	260
Swivel Ring Hanger			104
180 Degree Shield	265P	80	
Pipe Saddle	351	170 & 1700 Series	180 Series
Rigid Trapeze	371	Std. 45	
U-Bolt	283	176	137
Riser Clamp	89 or 126	241	261
Double Bolt Pipe Clamp	304	261	295

Welding Beam Attachment	113B	751	66
Insert Continuous	650		280
Slotted Insert	1480	190	
Pipe Shield	265P		167

C. Insulation Protection

1. For all insulated pipe furnish clevis hangers with welded shields and equal to C&P, Inc., Fig. 100-SH.

D. Pipe Supports in Pipe Chases

1. Supports shall securely hold piping, prevent vibration, etc. Provide pipe supports and channels as required. Use Grade KJA Cycolac DH self-extinguishing ABS as manufactured by the Sumner Corporation or approved equal.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Pipe Hangers and Supports

1. Hangers for horizontal piping (insulated and uninsulated) one inch and smaller supported from above shall be malleable iron adjustable swivel ring type and shall comply with MSS SP-69 Type 6.

2. Hangers for horizontal piping (insulated and uninsulated) and insulated copper tubing larger than one inch shall be of carbon steel adjustable clevis type and shall conform to MSS SP-69 Type 1.

3. Hangers for uninsulated horizontal copper tubing one inch and smaller, supported from above shall be of malleable iron with copper finish, adjustable ring type, complying with MSS SP-69 Type 6, or with MSS SP 69 Type 15 if with Turnbuckle Adjuster.

4. Hangers for uninsulated horizontal copper tubing larger than one inch shall be of carbon steel with copper finish adjustable clevis type, complying with MSS SP 69 Type 1.

5. Riser clamp support for vertical piping and copper tubing shall be double bolt with each end having equal bearing on the building structure are located at each floor. If piping is insulated, riser clamp shall be placed under insulation.

6. Support for horizontal pipe runs on roof shall be heavy-duty pipe rollers. Rollers assembly shall consist of galvanized steel channel track, galvanized steel fittings, washers and nuts, painted cast iron roller and locking devices to maintain pipe location. Assembly shall allow both vertical and horizontal adjustment. Heavy-duty pipe roller support shall be with integral base plate and shall be of the Pate Company, Custom Curb Inc. (Eastern Plant), Miro Industries, Cooper B-Line, Inc. or Portable Pipe Hangers. The support for the gas piping installed horizontally on the roof shall be anchored or secured to the concrete deck. The base plate of the pipe roller support shall be secured to the concrete deck using stainless steel anchors. A 12" galvanized steel with integral base plate or a pipe support base made of polycarbonate plastic with bored holes for securing same to the concrete decking are acceptable

7. Trapeze hangers shall be made of 2" x 2" x 1/4" carbon steel angle iron with drilled holes and 1/2" hanger rods.

8. At all points of support a galvanized steel shield shall be provided between the hanger and pipe insulation.

PART 3 – EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. Provide necessary structural members, hangers and supports of approved design to keep piping in proper alignment and prevent transmission of injurious thrusts and vibrations. In all cases where hangers, brackets, etc., are supported from concrete construction, care shall be taken not to weaken concrete or penetrate waterproofing. All hangers and supports shall be capable of screw adjustment after piping is erected. Hangers supporting piping expanding into loops, bends and offsets shall be secured to the building structure in such a manner that horizontal adjustment perpendicular to the run of piping supported may be made to accommodate displacement due to expansion. All such hangers shall be finally adjusted, both in the vertical and horizontal direction. Hangers in contact with copper or brass pipe shall be copper plated steel.

B. Pipe hangers shall be of the clevis and pipe roller types, except where otherwise noted.

C. Where piping is run near the floor and not hung from the ceiling construction but is supported from the floor, such supports shall be of pipe standards with base flange and adjustable top yoke similar to C&P Fig. 101 or equal.

D. Except where otherwise noted, piping shall be supported from structural steel only. Provide supplementary steel where required.

E. Piping shall not be hung from other piping, ducts, conduits or from equipment of other trades.

F. All water piping connected to rotating equipment within all mechanical spaces shall be isolated from the building structure by means of vibration hangers inserted in the hanger rods. The vibration hangers shall consist of a steel spring in combination with a double deflection neoprene element within a rectangular steel housing. Combined static deflection shall be 1.375" minimum. Hangers shall have capability of supporting the piping at a fixed elevation during installation and shall incorporate an adjusting device to transfer the load to the spring. Deflection shall be indicated by means of scale. Vibration hangers shall be Fig. No. 360 or type PCDNHS as made by Mason Industries, as specified under another Section of these Specifications.

G. Where additional steel is required for the support of hangers, furnish and install same subject to the approval of the Architect. Piping shall not be supported from the metal deck slab construction.

H. All piping running on walls shall be supported by means of hanger suspended from heavy angle iron wall brackets. No wall hooks will be permitted.

I. All anchors shall be separate and independent of all hangers, guides and supports. Anchors shall be of heavy blacksmith construction suitable in every way for the work approved by the Architect. Anchors shall be welded to the pipe and fastened to the structure with anchor type bolts.

J. Anchors shall be fabricated and assembled in such a form as to secure the piping in a fixed position. They shall permit the line to take up its expansion and contraction freely in opposite directions away from the anchored points; and shall be so arranged as to be structurally suitable for particular location and line loading. Submit details for approval.

K. All horizontal steel and copper pipe shall be supported at maximum intervals as follows: Steel pipe - up to 1-1/4" - 8'-0"; 1-1/2" to 2-1/2" - 10'-0"; 3" and larger - 12'-0". Copper tube and Brass Pipe - up to 1-1/4" - 6'-0"; 1-1/2" to 2-1/2" - 8'-0"; 3" and larger - 10'-0". There shall be no metal-to-metal contact at supports for non-ferrous pipes. Provide 1/8" thick lead strips or Summer Inc. pipe clamps under uninsulated piping at supports. Hangers and supports shall be installed outside of insulation or insulated piping.

L. Trapeze type hangers shall be made up of angles bolted back-to-back or channels for supporting parallel lines of piping. Trapeze type hangers shall be supported with suspension rods having double nuts, and securely attached to construction with inserts, beam clamps, steel fishplates, cantilever brackets, lag screws or other approved means. Use approved type brackets for supporting piping attached along walls. Non-insulated piping (compressed air, gas, etc.) supported by trapeze hangers shall be provided with hold down clamps at the trapeze hangers. If only non-ferrous piping (copper, etc.) is supported on the trapeze hangers, the trapeze and hold down clamps shall be copper clad.

M. Maximum weights on hanger rods shall be such that stress in tension shall not exceed 9,000 psi, using root area of threaded portion. In no case shall hanger sizes be less than 3/8" for pipe up to

2", 1/2" for pipe 1-1/2" to 3-1/2", 5/8" for pipe 4" to 5", 3/4" for pipe 6", 7/8" for pipe 8" to 12".
N. Supports for vertical piping shall be double bolt riser clamps, with each end having equal bearing on the building structure located at alternate floors. Cast iron soil and copper pipe shall be supported at every floor and at its base.

N. All auxiliary steel for pipe supports shall be furnished and installed under this Section.

O. NO-HUB PIPING - ADDITIONAL REQUIREMENTS

A. Sway bracing shall be provided at changes in direction greater than 45° for pipe sizes 4” and larger.

B. On horizontal piping, additional hangers shall be provided at each horizontal branch connection.

C. Horizontal piping 6" and larger shall be braced to prevent joint separation.

D. Vertical piping shall be braced at each joint to assure maintaining alignment.

E. Vertical piping shall be secured at base of stack to building structure with socket clamp and rods or trapeze hangers.

P. All hangers, rods, inserts, clamps, stanchions, brackets, etc., shall be dipped in zinc chromate primer before installation and provided with one (1) coat of approved type paint after installation. (Refer to Section 15000.)

Q. Chains, straps, perforated iron or wire hangers are not permitted.

R. The Architect must approve method of supporting pipes from building structure before work is started. The Contractor shall bear all responsibility for materials and workmanship as described in this Section, and shall make sure that all hangers and supports are properly and permanently connected to building structure. No piping shall be hung from metal deck; auxiliary steel shall be provided.

S. All pipe support shall be installed to avoid interference with other piping, hangers, electrical conduits and supports, building structures and equipment.

END OF SECTION 22 05 29

SECTION 22 05 53

TAGS, CHARTS AND IDENTIFICATION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work of this Section includes the following:

1. Tags
2. Accessories
3. Charts and Frames
4. Pipeline Identification

1.2 SUBMITTALS

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

B. Shop Drawing:

1. Provide list of identification wording, symbols, letter size, and color coding.
2. Valve numbering scheme; valve Schedules: For each piping system to be included in maintenance manuals.

C. Samples: Submit samples of tags and identification markers for each different type of service. Samples shall be submitted and approved before installation.

PART 2 - PRODUCTS

2.1 TAGS

A. All controlling valves on hot water, circulation, cold water and gas supply pipes throughout the building, except those at fixtures, shall be furnished with heavy brass tags 2" in diameter, with numbers and the words "Hot", "Circ.", "Cold" or "Gas" thereon. The numbers and letters shall be of the block type, indented and filled with durable black compound. The letters shall be 1/4" high and the numbers shall be 1/2" high. The tags on circulation (Circ) pipe valves shall be numbered the same as the hot water valve controlling the riser or branch to which the circulation pipe is connected.

B. Tags shall be as manufactured by Seton Nameplate Corp., Brimar Industries, Inc., Marking Services Inc., EMED Co., Inc.

2.2 CHARTS AND FRAMES

A. The numbers on valves for hot, circ., cold and gas shall be arranged in the following manner:

In cellar or basement commencing with	No. 1
In the first story commencing with	No. 100
In the second story commencing with	No. 200
In the third story commencing with	No. 300
In the fourth story commencing with	No. 400
In the fifth story commencing with	No. 500
In penthouses commencing with	No. 600

B. If it should occur that the number of valves on any floor exceed the number of tags provided for said floor, then a letter must be added which would read, for example 100A or 100B, and so on, until all valves on the floor are properly numbered, but in no case shall a number be applied other than as herein stated.

C. The number of each and every valve throughout the building shall be plainly typed on approved heavy paper. Opposite each number shall be set the location of the valve bearing that number, also the fixture or fixtures controlled by that valve. The charts shall be framed in an approved glazed frame. The frames shall be made of 1" wide oak picture molding with wood back, and shall be finished with natural color varnish with screw-eyes and wire for hanging same, and shall be submitted to the Authority for approval before installation.

2.3 PIPELINE IDENTIFICATION

A. Identification shall be in accordance with “Scheme for Identification of Piping System ANSI A13.1" and OSHA safety color regulation.

B. Markers shall be snap-on type as manufactured by Seton Nameplate Corp., (Setmark System**)** EMED Co., Inc., Brimar Industries, Inc., Marking Services Inc. Markers shall completely encircle the pipe with a substantial overlap. No adhesive shall be used. They shall be manufactured of UL approved, self-extinguishing plastic. When the pipe including insulation (if any) is 6" diameter and larger, markers shall be strap on type.

C. Provide identification for piping, and equipment.

D. Pipe shall be lettered in accordance with the schedule below. Lettering shall be located at the supply side of each valve and branch connection and at intervals of not over 20'(10' on fire lines in the basement and cellar and **5’-0” for** gas lines **everywhere**) on straight runs of pipe. Provide flow arrows for all piping at each marker. Adjacent to the legend, stencil the size of the pipe. Background and letter colors are as follows: Yellow with black letters, green with white letters, blue with white letters and red with white letters.

STENCIL SCHEDULE

Service	Stencil Designation	Background Color
Cold Water	Cold Water	Green
Cold Water Make-up	Cold Water Make-up	Green
Hot Water	Hot Water 105°F	Yellow
Hot Water (Kitchen)	Hot Water 140°F	Yellow
Hot Water Circulating	Hot Water Cir. 105°F	Yellow
Hot Water Circulation (Kitchen)	Hot Water Cir. 140°F	Yellow
Sanitary Sewer	San. Sewer	Green
Storm Sewer	Storm Sewer	Green
Combined Sewer	Comb. Sewer	Green
Storm Water Piping	St. W.	Green
Soil Piping	Soil	Green
Waste Piping	Waste	Green
Vent Piping	Vent	Green
Gas	Gas	Safety Yellow
Gas Vent	Gas Vent	Safety Yellow
Compressed Air	Compressed Air ___ psi	Yellow above 90 psi Blue below 90 psi
Pump Discharge	Pump Disch.	Green

E. The nature of service of all machinery, equipment, tanks, pumps, and other apparatus shall be stenciled in 2" high letters unless otherwise directed.

2.4 ACCESSORIES

A. Accessories for attaching tags to their respective hot, circ., cold, and gas valves shall include solid brass jack chain with adjustable open and close links and solid brass S-Hooks.

B. Jack chains and S-hooks shall be as manufactured by Seton Nameplate Corp., EMED Co., Inc., Brimar Industries, Inc., Marking Services Inc.

2.5 GAS PIPING IDENTIFICATION

A. All gas piping shall be identified by a yellow label marked “GAS” written in black letters and in accordance with ASME A13.1. On the same label or adjacent to it, the gas pressure for each line shall also be marked.

1. Manufacturers: Marking Services, Inc., Brimar Industries, Inc., EMED Co., Inc.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Attach solid brass tags to their respective hot, circ., cold and gas valves with jack chain and S-Hooks.

B. Hang the charts and frames where directed, as follows:

1. One (1) in Boiler Room or Mechanical Room

2. One (1) in Custodian's Office

3. One (1) on each floor

3.2 INSTALLATION OF LABELS ON GAS PIPING (NOT USED)

END OF SECTION 22 05 53

SECTION 22 05 80

TESTING AND ADJUSTMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section is to coordinate with and be complementary to the General Conditions, General Requirements and Supplemental General Requirements, wherever applicable to Mechanical and Electrical Work.

B. Section 21 00 00 - Special Requirements for Mechanical and Electrical Work shall apply.

C. Section 22 05 00 – Common Work Results for Plumbing shall apply.

1.2 SCOPE OF WORK

A. The Work of this Contract includes providing all labor, materials, accessories, services and tests necessary to install, complete and make ready for operation by the Owner, all work as shown on the Drawings and as specified hereinafter.

1.3 REQUIREMENTS

A. All tests shall be made in the presence of the Architect or their representatives, and the local authorities having jurisdiction of the work to be tested, as may be directed; and at least 72 hours notice shall be given in advance of all tests.

B. The Work of this Contractor shall include the furnishing of all testing instruments, gauges, pumps, smoke machines, and other equipment required or necessary for tests, required by laws, rules and regulations and as specified.

C. Provide all other tests required by local inspectors and all other authorities having jurisdiction.

D. All appurtenances shall be operated after installation to determine whether or not they meet the requirements of the Specifications.

E. All defects disclosed in the work by tests and otherwise shall be made good or the Work replaced without additional cost to the Owner. No caulking on screwed joints, cracks or holes will be acceptable.

F. Tests shall be repeated after any defects disclosed thereby have been made good or the work replaced if it is deemed necessary.

G. All tests shall be made at the expense of the Contractor.

H. Tests are not permitted to be made with air except as noted.

I. Contractor to provide required test plug tee fittings during erection of pipe system.

J. If the pipe installation fails to meet testing requirements, the Contractor shall determine at his own expense the source or sources of leakage, and he shall repair or replace all defective materials or workmanship. The completed pipe installation shall meet the requirements of the tests after the leaks have been corrected.

K. All piping which is to be enclosed in partitions or hung ceilings shall be tested and made tight when directed by the Construction Supervisor and in adequate time to permit the installation of partitions and ceilings. When necessary, the Contractor shall drain the piping 9 and/or take over such precautions as required to prevent damage by freezing.

L. The Contractor shall also be responsible for the Work of other trades that may be damaged or disturbed by the tests, or the repair or replacement of his Work, and he shall, without extra charges, restore to its original condition any Work so damaged or disturbed.

PART 2 – (NOT USED)

PART 3 - EXECUTION

3.1 SITE UNDERGROUND SANITARY PIPING (NOT USED)

3.2 SITE UNDERGROUND WATER PIPING (NOT USED)

3.3 INTERIOR DOMESTIC WATER SYSTEMS

A. Domestic cold, hot and hot water circulation system: The entire water supply system shall be tested to a hydrostatic pressure of 150 pounds per square inch or 1E1 times the system pressure, whichever is greater, at lowest point of the water system in the building, and proved tight at this pressure before fixtures are installed. Water supply piping, if in any way concealed by structural work, shall be tested to the aforesaid pressure and proved tight before pipes are concealed.

B. The test pressure shall be held for a period of not less than two (2) hours. The piping system shall be considered tight if the drop in pressure does not exceed 2 pounds per square inch during the test period. If the pressure drop exceeds 2 pounds, all repairs and alterations in the piping system necessary to meet the test shall be made.

3.4 INTERIOR SANITARY WASTE SYSTEM

A. The entire piping of the sanitary system and of the storm water system shall be tested with water in accordance with NY State Plumbing Code and the Local Plumbing Inspector's requirements and proved tight before the trenches are backfilled or fixtures connected.

B. The water tests of the piping of the sanitary system and the piping of the storm water system shall comply with the requirements of the Plumbing Code and all Local Authorities.

C. All drainage and vent systems shall be filled with water and proven tight under a 10'-0" head over new building roof for a minimum of two (2) hours. Water level must remain constant throughout test without adding water.

D. After all fixtures have been permanently connected to the sanitary system and the system is completed, a smoke test shall be applied to the sanitary system, and the entire system proved tight to the satisfaction of the Architect, when filled with smoke under pressure equal to 1" column of water. The smoke shall be produced by a smoke generating machine and not be chemical mixtures. Test shall be performed for a minimum duration of 15 minutes before any inspection is performed.

3.5 SITE FIRE PROTECTION PIPING (NOT USED)

3.6 INTERIOR NATURAL GAS SYSTEM (NOT USED)

END OF SECTION 22 05 80

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SECTION 22 07 00

PLUMBING INSULATION

PART 1 – GENERAL

1.1 DESCRIPTION

A. This Section is to coordinate with and be complementary to the General Conditions, General Requirements and Supplemental General Requirements, wherever applicable to Mechanical and Electrical Work.

B. Section 21 00 00 - Special Requirements for Mechanical and Electrical Work shall apply.

C. Section 22 05 00 – Common Work Results for Plumbing shall apply.

1.2 SCOPE OF WORK

A. The Work of this Contract includes providing all labor, materials, accessories, services and tests necessary to install complete and make ready for operation by the Owner, all work as shown on Drawings and as specified hereinafter.

B. The piping systems and equipment to be insulated shall include, but not be limited to the following:

1. Domestic cold water hot water and hot water circulating piping.

2. Domestic water meter.

PART 2 - PRODUCTS

2.1 INSULATING MATERIALS

A. All insulation shall have a composite (insulation, jacket facing and adhesive used to adhere jacket or facing to the insulation) fire and smoke hazard ratings as tested by Procedure ASTM E-84, NFPA 255 and UL 73, not exceeding flame spread of 25, fuel contributed of 50, and smoke developed of 50. Accessories such as adhesives, mastics, cements, tapes and cloths for fittings shall have component ratings as listed above. Insulation shall be glass fiber with a maximum K factor 0.23 at 75°F. mean temperature. Density shall not be not less than 3 lbs. per cu. ft.

B. The materials as specified below have been selected from the catalog of Owens-Corning Fiberglass Corp. and are representative of the quality, design and finish desired. Insulation as manufactured by other manufacturers may be submitted for approval, provided the products meet fully in all respects (such as density, moisture absorption, alkalinity, thermal-conductivity, jacket, etc.) the materials as designated below.

1. Fiberglass Pipe Insulation: FS HH-I-558B, Form D, Type III, Class as indicated.
   a. Provide Class 12 for hot and cold plumbing piping.

2. Fiberglass Pipe Fitting Insulation: FS HH-I-558, Form E, Class as indicated.
   a. Provide Class 16 for use with Class 12 pipe insulation, where temperature does not exceed 450°F.

3. Flexible Unicellular Pipe Insulation: FS HH-I-573, Class T.
   a. Calcium Silicate Pipe Insulation: FS HH-I-523, Type II, except Type I where needed, factory applied jacket Class B.

4. Vapor Barrier Materials: FS HH-B-100, Type I, paper-backed aluminum foil, except as otherwise indicated, strength and permeability rating equivalent to adjoining pipe insulation jacketing.

5. Bends shall be 0.016 inch thick, 1/2" aluminum spaced 18" on center, finish cement shall be J-M No. 375 or smooth coat by Insulation Industries, Inc.

6. Wires shall be 20 gage galvanized annealed steel, sealer shall be layer of J-M Duramesh 207 or equal.

7. Adhesives and Protection Finish shall be Benjamin Foster 30-36.

8. Jacketing Material for Equipment Insulation: Provide pre-sized glass cloth or canvas material, mot less than 7.8 ounces per square yard.

9. Fitting and Valves: Zeston 25/50 rated -20 mil P.V.C. covers over fiberglass insulation.

2.2 RELATED MATERIALS AND REQUIREMENTS

A. At pipe supports Insul-Shield pipe saddles and matching hanger shall be used. Joints of insulation abutting Insul-Shielding pipe saddles shall be butted with IC-405, and the joints firmly pressed together.

B. All concealed and exposed piping shall be provided with factory ASJ (Owens/Corning Fiberglass) secured in place with vapor barrier adhesive IC-225. Provide 1/2" aluminum bands spaced 18" on centers.

2.3 INSULATION REQUIREMENTS

A. Cold Water Piping

1. 1" thick insulation for pipe sizes up to and including 2" in diameter.

2. 1½" thick insulation for pipe sizes larger than 2” in diameter

B. Hot Water Piping (105 ° F -140 ° F)

1. 1" thick insulation for pipe sizes less than 1½” pipe diameter.

2. 1½" thick insulation for pipe sizes 1½” in diameter and up to 3” pipe diameter.

3. Hot Water Circulating - all sizes - 1" insulation.

C. Miscellaneous Equipment

1. Insulate water meter with pre-manufactured insulation kit which shall include the following:
   a. 1.5 pound density fiberglass blanket, 2" hexagonal galvanized mesh wire and insulating cement.

   b. Where drain and water pipes under lavatories are exposed, protect against contact with Plumberex Shield or approved equal.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Maintain integrity of vapor-barrier jackets on pipe insulation, and protect to prevent puncture or other damage. Staples shall not be used on vapor barrier.

B. Cover valves, flanges, fittings and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory, precut or job fabricated units (at Installer's option) except where a specific form or type is indicated.

C. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.

D. Install protective metal shields and insulated inserts at each hanger and support to prevent compression of insulation.

E. Do not apply insulation to hot equipment.

F. Apply insulation using the staggered joint method for both single and double layer construction, where feasible. Apply each layer of insulation separately.

G. Coat insulated surfaces of equipment with layer of insulating cement, troweled in a workmanlike manner, leaving a smooth continuous surface. Fill in scored block, seams, chopped edges and depressions, and cover wire netting and joints with cement of sufficient thickness to remove surface irregularities.

H. Cover insulated equipment surface with jacketing neatly fitted and firmly secured. Lap seams at least two inches. Apply over vapor barrier where applicable.

I. All horizontal storm drainage piping (except in service/utility corridor) under roofs, exposed and above hung ceiling, and roof drain bodies shall be insulated (sweat-proofing) as specified for water piping, but nested larger diameter covering over hubs and drain bodies.

J. Insulation for horizontal runs and off-sets including fittings and vertical off-sets of storm water piping shall be of the thickness specified for cold water piping

K. Direct contact between pipe and hanger shall be avoided. Hanger shall pass outside of metal saddle which cover a section of high density insulation (such as calcium silicate) of sufficient

length to support pipe without crushing insulation. Hangers or saddles shall not pierce insulation and vapor barriers.

3.2 INSTALLATION REQUIREMENTS

A. Install insulation products in accordance with the manufacturer's written instructions, and in accordance with recognized industry practices to ensure that the insulation serves its intended purpose.

B. Install insulation on pipe systems subsequent to testing and acceptance of tests.

C. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with a single cut piece to complete the run. Do not use cut pieces of scraps abutting each other.

D. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure a complete and tight fit over surfaces to be covered.

E. The Contractor shall take every precaution necessary to ensure that the covering material is in satisfactory condition to receive painting.

F. Penetration of walls and floors by piping connection to rotating equipment shall be provided with a fiberglass sleeve, the full depth of pipe penetration.

G. In all cases where new piping connects to existing piping that is insulated, the existing insulation that is removed to make the new connection shall be replaced with new insulation as hereinafter specified.

H. Do not insulate hand holes, cleanouts, ASME stamp, or the manufacturer's nameplate. Provide neatly beveled edge at interruptions of insulation.

I. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

J. The installer of the piping insulation shall advise this Contractor of required protection for the insulation work during the remainder of the construction period, to avoid damage and deterioration.

END OF SECTION 22 07 00

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SECTION 22 10 01

PLUMBING PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section is to coordinate with and be complementary to the General Conditions, General Requirements and Supplemental General Requirements, wherever applicable to Mechanical and Electrical Work.

B. Section 21 00 00 - Special Requirements for Mechanical and Electrical Work shall apply.

C. Section 22 05 00 – Common Work Results for Plumbing shall apply.

D. All pipe and pipe fittings that convey water for human consumption must be certified for meeting the requirements of the federally mandated Reduction of Lead in Drinking Water Act of 2014 (not more than a weighted average of .25% lead). Regardless of the pipe manufacturer listed in these specifications, provide pipe and pipe fittings that meet the requirements of the act. All solder used during installation of piping associated with the potable water system designed for human consumption must also meet the requirements.

1.2 SCOPE OF WORK

A. The work of this Contract includes the providing of all labor, materials, accessories, services and tests necessary to install, complete and make ready for operation by the Owner, all work as shown on the Drawings and as specified herein.

1.3 SPECIFIC REQUIREMENTS

A. Pipe and fittings shall conform to the latest USASI, ASTM, ANSI and/or F.S. Standards, and/or Cast Iron Soil Pipe Institute Standards No. 301 and 310.

B. All pipes, fittings, traps, materials and/or other devices used in the plumbing system shall have cast, stamped, or indelibly marked on it the maker's name or mark, weight, and quality of the product when such marking is required by the approved standard.

2.1 EXTERIOR PIPING AND FITTINGS (NOT USED)

2.2 INTERIOR PIPING MATERIAL

A. Underground interior soil, waste, vent and storm piping shall be service weight cast iron soil pipe, and bell and spigot fittings, with neoprene gasket joints. Fittings for cast iron soil pipe below grade shall be service weight cast iron bell and spigot, and shall be as manufactured by Tyler or Central Foundry Company, or approved equal.

B. Interior above ground soil and waste piping in stacks and 5" and over soil and waste piping in chases shall be service weight cast iron soil pipe and bell and spigot fittings, with oakum packing and caulked molten lead in one continuous pour.

C. Interior, above ground, soil and waste piping, 4" and smaller in chases, storm vent and leader piping shall be no-hub, standard weight, cast iron soil pipe and fittings or galvanized steel screw pipe with galvanized cast iron recessed drainage fittings with galvanized malleable beaded fittings for vent piping.

D. Underground (below slab) domestic water piping shall be Type "K" copper tubing, soft temper ASTM B-88 with wrought copper brazed fittings, minimum 125 psi WWP. Solder joints shall be as specified for domestic water piping. All underground pipe and fittings shall be asphaltum coated.

E. Above ground interior domestic water piping 6" and larger shall be galvanized steel pipe with threaded galvanized malleable iron or galvanized flanged cast iron fittings minimum 175 psi WWP.

F. Above ground interior domestic water piping 5" and smaller shall be seamless drawn or extruded hard temper Type "L" copper tubing, ASTM B-88, with solder joint fittings. Fittings shall be copper. Joints shall be made with a solder alloy (95/5) consisting of tin-antimony conforming to ASTM Specification B-32 and a water washable flux conforming to ASTM B 813.

G. Sprinkler system pipe shall be suitable for 175 psi working pressure in accordance with ASTM B36.10-1950 and any subsequent revisions thereof, and shall be Schedule 40 black steel pipe. Fittings shall be of a type specifically approved for use in sprinkler and fire standpipe systems suitable for 175 psi working pressure and made of cast iron or malleable iron.

H. Subject to local approval, this Contractor has the option of using grooved end pipe with "Victaulic" or Gustin-Bacon mechanical type joints for the fire system. The Contractor shall state the materials in his bid that he intends to provide.

I. Suspension pipe and discharge sump pump pipe shall be extra-strong (Schedule 40) galvanized steel pipe, The use of grooved type fittings is acceptable in lieu of threaded or flanged fittings on sump pump discharge where only clear water will be discharged

2.3 STERILIZATION

A. The entire domestic water piping system shall be thoroughly sterilized with chlorine before acceptance for domestic operation.

B. The amount of chlorine applied shall be such as to provide a dosage of not less than 50 parts per million. The chlorinating material shall be either liquid chlorine or sodium hypochlorite solution and shall be introduced into the system and drawn to all points of the system. All lines shall be thoroughly flushed before introduction of the chlorinating material. After a contact period of not less than twenty four (24) hours, the system shall be flushed with clean water until the residual content is not greater than 0.2 parts per million. All valves in the lines being sterilized shall be opened and closed several times during the contact period.

C. Sterilization and tests for purity of water in the entire piping system shall be performed by the Contractor through an approved independent testing laboratory and a certificate shall be furnished to the Architect certifying the quality of purity.

D. All sterilization and tests performed shall be in conformity with NYS DOH Regulations and New York State Plumbing Code.

PART 3 - EXECUTION

3.1 INSTALLATION NOTES FOR SITE PIPING SYSTEMS (NOT USED)

3.2 INSTALLATION NOTES FOR INTERIOR PIPING SYSTEMS

A. It is the intent that each part of the plumbing systems shall be complete in all details and all lines provided with all control valves as indicated on Drawings, or as may be required for the proper control of the pipe lines under this Section so that any fixture, line or piece of apparatus may be cut out for repair without interference or interruption of the service to the rest of the building.

B. The size of soil, waste, water, and vent piping shall be as determined by the local rules and regulations for plumbing and drainage, except where specifically noted to be larger by the Specifications or plans; and all fixed rules of installation as set forth in the Rules and Regulations shall be followed as part of the Specifications.

C. The Contractor shall examine carefully the architectural plans and details and familiarize himself with all conditions relative to the installation of piping, particularly where same is concealed behind furring or in hung ceilings.

D. In no case shall the Contractor permit his pipes to be exposed beyond finished plaster lines unless specifically shown on Drawings. He shall consult with the other trades in the building and install his piping in such a way as to least interfere with the installation of other trades.

E. Water piping shall be installed to drain, and branches shall not be trapped, but shall have continuous pitch. Where necessary to raise or lower mains, the same shall be provided with a drip and shall be properly valved and capped.

F. Piping shall be installed, whether indicated or not, so as to rise and/or drop to clear any and all conduits larger than 1", lighting fixtures, ductwork and heating mains, to maintain the desired

equipment and piping.

G. Run piping straight and as direct as possible. In general, form right angles with or parallel to walls or other piping. Risers shall be erected plumb and true.

H. After cutting, all pipes shall be reamed out to full bore and before erection the inside of all pipes shall be thoroughly cleaned.

I. No piping or work shall be concealed or insulated until all required tests have been satisfactorily completed and work has been approved by the Architect and all other authorities having jurisdiction.

J. Branch connections of the drainage systems shall be made with "Wye" and long "Tee-Wye" fittings, short 3" bends, common offsets and double hubs will not be permitted. Short "TeeWye"" fittings are to be used in vertical piping only.

K. Cleanouts shall be provided at foot of all stacks, all changes of direction greater than 45 degrees, at the ends of branch runs where shown, every 50'-0" and as required by Code, and shall be furnished as described under cleanouts.

L. The house drains must be run at a minimum grade of 1/8" per foot downward in the direction of flow. Wherever possible, a 1/4" per foot pitch shall be maintained. Branch connections to stacks from fixtures shall pitch 1/4" per foot where possible. Attention is again called to the necessity of maintaining the ceiling heights established.

M. Furnish and install complete systems of ventilating pipes from the various plumbing fixtures and other equipment to which drainage connections are made. Ventilating pipes shall be connected within 2'-0" of the discharge of each trap and shall be individually piped to point above the ultimate overflow level 'of the fixture before connecting with any other vent pipe (in general, this will be approximately 3'-6" above the finished floor). Branches shall be arranged to pitch back to fixtures.

N. The individual vent pipes shall be collected together in branch vent lines and connected to vent stacks, wherever possible, vent stack offsets shall be made with 45 degree fittings. The heels of vent stacks shall be connected to adjacent soil stacks for purpose of draining condensation where possible. The waste of one fixture shall be connected to the base of each vent stack for the purpose of washing out any scales or dirt which may accumulate, or the soil stack shall be used to wash out the heel of the vent.

O. The tops of all soil and waste stacks shall be extended as additional ventilating pipes. The tops of all ventilating stacks shall run independently through the roof. Pipes smaller than 4" size shall be increased to 4" by means of approved increasers before passing through the roof.

P. Expansion loops and anchors shall be provided on all hot water and hot water circulation mains. Expansion loops shall be made with four elbows and three lengths of pipe, except as otherwise noted on the Drawings. All loops shall be prestressed.

Q. All piping installed in finished areas shall be completely concealed within hung ceilings, furrings, soffits, pipe spaces, etc.

ix. Where complete coordination is impossible because of obstructions such as beams, ducts, lights, piping, etc., the Contractor shall not install any work before first consulting with the Architect and his instructions (written or revised Drawings) shall be followed.

END OF SECTION 22 10 00

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SECTION 22 42 00

COMMERCIAL PLUMBING FIXTURES AND TRIM

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section is to coordinate with and be complementary to the General Conditions, General Requirements and Supplemental General Requirements, wherever applicable to Mechanical and Electrical Work.

B. Section 21 00 00 - Special Requirements for Mechanical and Electrical Work shall apply.

C. Section 22 05 00 – Common Work Results for Plumbing shall apply.

1.2 SCOPE OF WORK

A. The Work of this Contract includes providing all labor, materials, accessories, services and tests necessary to install complete and make ready for operation by the Owner, all work as shown on Drawings and as specified hereinafter.

B. All faucets, bubblers, mixing valves must be certified as “lead free” as defined in the Reduction of Lead in Drinking Water Act of 2011 (not more than a weighted average of .25% lead). Regardless of model numbers indicated herein, provide equivalent models that are “lead free” as defined in the act. All solder and flux used during installation of all faucets, bubblers, mixing valves associated with the potable water system must also meet the lead-free requirements of the act.

1.3 SUMMARY

A. This Section includes the following:

1. Traps
2. Thermometers
3. Pressure gauges
4. Vacuum breakers
5. Hot water mixing valve
6. Fixture stops.
7. Drains
8. Cleanouts
9. Water closets

10. Lavatories
11. Kitchen sink
12. Water hammer arrestors
13. Fixture sealant.
14. Latex cement grout
15. Vandal proof hooded vent caps.

1.4 QUALITY ASSURANCE

A. All fixture trimmings, including faucets, strainers, escutcheons, shower heads and arms, water closet supplies, stops, waste traps, escutcheons, visible hangers or chair carrier nuts shall be made of brass and shall be polished chromium plated. All material specified, such as chromium plating, shall be thoroughly and evenly applied and guaranteed not to strip-or peel. All chromium plating on plumbing fixture trim shall be in accordance with Federal Specification WW-P-541b for grade "R" plating. Manufacturer shall submit certification that all chromium plating on finished trim meets the Federal Specification. All plated work shall be highly buffed. Plastic, zinc or white metal will not be acceptable.

B. All fixtures shall be free from imperfections, true as to line, angles, curves and color, smooth, watertight, nameplate in every respect and practically noiseless in operation. Fixtures as specified are given as a typical standard and they or other approved fixtures shall be furnished, set and connected in a good, substantial, neat and workmanlike manner.

C. All fixtures specified to be vitreous ware shall be fixed vitreous china ware of the best quality, non-absorbent and burned so that the whole mass is thoroughly fused and vitrified, producing a material white in color which, when fractured, will show a homogenous mass, close grained and free from pores. The glazing and vitreous china fixtures shall be white, thoroughly fused and united to the body, without discoloration, chips, or flaws, and shall be free from craze. Warped or otherwise imperfect fixtures will not be acceptable.

D. Each supply fixture, casework fixture and equipment, shall be separately controlled by its own stops. Locate as required on wall, above floor or as directed.

E. All faucets shall have metal handles.

F. All trim shall be permanently stamped with manufacturer's identification and visible after installation.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURE SCHEDULE

A. The Plumbing Contractor shall base his proposal upon this manufacturer of fixtures, but he may submit the fixtures of another approved equal manufacturer. Color of fixtures shall be white unless noted otherwise.

2.2 TRAPS

A. Each fixture and piece of equipment requiring connection to the drainage system shall be separately trapped by means of a water seal trap placed as close to the fixture as possible.

B. All running traps on drains, etc., shall have inlet handhole cleanouts and brass plug cleanouts in bottom. Cast iron traps below grade shall have bottom plug omitted. All exposed P traps shall have bottom cleanouts and shall be chromium plated brass.

2.3 AIR CHAMBERS (NOT USED)

2.4 HOSE BIBBS (NOT USED)

2.5 WALL HYDRANTS (NOT USED)

2.6 THERMOMETERS

A. Thermometers shall be adjustable angle type with red reading organic liquid, 7" black baked enamel case, black on white scale, a range from 30°F. to 240°F, and a separable brass socket. Thermometers shall be so installed and adjusted that they are easily readable from a normal standing ,position on the floor. Thermometers shall be similar or approved equal to U.S. Gauge "Multi-Angle".

2.7 PRESSURE GAUGES

A. Pressure gauges shall have 3-1/2" diameter black enamel cast aluminum case with threaded brass ring, heavy glass, phosphor bronze bushed, rotary precision movement and dial ranges of 0 to 100 psi for water service. Pressure gauges shall be similar or approved equal to Trerice Co. No. 500X, with brass tee handle cock.

2.8 VACUUM BREAKERS

A. Provide vacuum breakers on water supply piping to each fixture and piece of equipment with submerged inlets, and on faucets and outlets within the building to which hoses can be or are attached. Set vacuum breakers in exposed readily accessible locations and at least 6'-6" above finished floor. Vacuum breakers shall be chrome plated brass, T&S Brass No. B-929-A or approved equal.

2.9 HOT WATER MIXING VALVE STATION

A. Master tempering valve for controlling hot water temperature delivered to plumbing fixtures shall be of the thermostatic type complying with ASSE 1017. Valve shall be of bronze body construction and shall come equipped with unions, check-stops and strainers to screen out water-born debris. Valve shall be equipped with a means to limit the maximum setting of the valve to

120°F, which shall be field adjusted in accordance with the manufacturer's instructions. Master tempering valve(s) shall be from one of the following series

1. Lawler – Model #800 Series – High–Low – Temperature Range 90oF to 120oF.
2. ACORN – MV17 Series
3. Leonard – XL-150-LF-BDT

2.10 FIXTURE STOPS

A. Provide fixture stops as manufactured by the Dole Valve Company or approved equal. Fixture stops are to be installed in accordance with the manufacturer's recommendations and shall be provided for all sinks, lavatories and electric water coolers.

B. All Lavatories: Dole Model #FMA 3/8" male pipe inlet and 3/8" female pipe outlet for rigid hot and cold supply risers. Flow rate 0.5 gpm.

C. All sinks including equipment with sinks, mop receptors, service sinks and kitchen sinks, showers shall be Dole Model #FMC male pipe inlet and 1/2" female pipe outlet for hot and cold supply risers. Flow rate 4 gpm for service sinks and mop receptors, 3 gpm for kitchen and casework sinks, 2.5 gpm for showers.

D. Electric Water Coolers: Dole Model #F3/4C male pipe inlet and 3/8" female pipe outlet for cold supply riser. Flow rate 0.5 gpm.

E. All exposed-to-view fixture stops and related piping shall be chrome plated nickel, or nickel plated.

2.11 DRAINS

A. Drains shall have heavy cast iron, with double drainage flange and weep holes, with outlet connections as indicated and of sizes indicated on Drawings. Drains (except as noted) shall be furnished with high polished brass tops consisting of a one-piece rim secured to the body and vandal-proof spanner type screws, and a solid brass grate with reinforcing members on underside. Removable sediment basket shall be of heavy duty one-piece construction as specified hereinafter. All strainers or grates shall be secured with vandal-proof spanner type screws, unless otherwise specified.

B. All drains in floors with a waterproof membrane shall be equipped with 6 lb. lead flashing or 20 oz. soft rolled sheet copper and secured to the flashing flange with brass bolts and cast iron clamping device. Flashings shall bond not less than 1 '-0" on all sides into membrane waterproofing.

C. Set all drains in such a way that the floor finish and top of the drain will be plumb and flush with finish floor without requirements for future additional extension, modifications, etc.

D. When Dex-O-Tex and/or vinyl waterproof floor is indicated on the Architectural Drawings, -all drains must be provided with required flanges.

E. Drains in mechanical rooms shall be equipped with a trap seal guard in lieu of a trap primer.

F. Approved manufacturers:

1. Floor Drain Type -1. (Toilet rooms) shall be cast iron, two-piece body with double drainage flange and seepage openings, bottom outlet caulk connection, flashing clamp device, and 6" round adjustable strainer of polished brass or bronze as manufactured by Smith Fig. 2010A-PB-U, Zurn ZB415B-103-VP, Josam 30000-6A-2-VP-X, Wade 1100STD, MIFAB F1100C(6)-1-6 or Watts Drainage Products FD-100-A6-6.

2. Floor Drain Type-2 : (Mechanical Spaces, elevator pit, cellar – i.e. not on grade) shall be cast iron, triple drainage, bottom outlet caulk connection, medium duty round grate and slotted sediment bucket with 3/8" or 1/4" bottom drainage openings, so designed that grate cannot be set unless bucket is in position as manufactured by Smith Fig. 2230, Zurn Z540-VP, Wade 1210-TD, Josam 32220-81-X-VP, MIFAB F1340-TFB-4 or Watts Drainage Products FD 340-X-Y-SET-6 or approved equal.

3. Trap seal Guard (Mechanical Spaces, elevator pit, cellar) : wherever the drain is expected to be dry, a trap seal guard shall be utilized and as manufactured by Mifab MI Guard, Wade or approved equal.

2.12 CLEANOUTS

A. Provide easily accessible cleanouts where indicated; at base of vertical stacks and leaders, at ends of horizontal drainage lines and at intervals not exceeding 50 ft., at each change of direction, on hand holes of running traps, and where indicated to make entire drainage system accessible for rodding. Provide at least 18 inch clearance to permit access to cleanout plugs.

B. Cleanouts for cast iron pipe shall consist of tapped extra heavy cast iron ferrule caulked into cast iron fittings, and extra heavy brass screw plug with solid hexagonal nut.

C. Cleanouts turning out through walls and up through floors shall be made by long sweep ells of "Y" and 1/8 bends with plugs and face or deck plates to conform to architectural finish in room. Where no definite finish is indicated on the Architectural and/or Mechanical Drawings, wall plates shall be chrome plated cast brass and floor plates shall be nickel bronze. Screws in cleanouts in finished areas shall be vandal-proof.

D. Cleanouts shall be full size at the pipe up to and including 6 inch pipe. On larger size piping, 6 inch size plugs shall be used.

E. The following schedule indicates the various types of cleanouts desired at various locations indicated on the Drawings. These cleanouts have been selected from the catalog of Zurn and are representative of quality design and finish desired. Cleanouts of Josam Mfg. Co., or J.R. Smith may be submitted provided they meet Specifications fully in every respect (such as material, weight, clamping features, finish, etc.).

F. The characteristics and quality of the cleanout shall be as follows.

1. Cleanout fitting in vertical stacks shall consist of tapped tees, capable of receiving a rough brass raised head cleanout plug; Zurn 1460-8.

2. Cleanouts in Dex-O-Tex waterproof floors shall be Zurn No. Z-1405-18 with extra heavy duty top.

3. Cleanouts for 3 or more fixtures piped horizontally shall be extended to wall cleanouts, and shall be Zurn No. Z-1470.

4. Cleanout for exposed pipes shall be MIFAB C1450, Zurn Z1440-BP, WATTS CO-380-RD, Smith 4420.

   Cast iron spigot ferrule with cast bronze taper thread plug and S/S cover.

5. Finished Floor cleanout shall be Smith 4028-U, Wade W-6000-1,75, MIFAB C1100, Zurn ZN1400-BP-VP, WATTS CO-200-R

   Cast iron floor level cleanout assembly with round, adjustable, scoriated, nickel bronze top, and no-hub outlet; taper thread, bronze plug and vandal-proof screw

6. Wall cleanout shall be Zurn Z1446-BP-VP, Smith 4532-U, MIFAB C1460-RD-6, WATTS CO-460-RD.

   Cast iron cleanout tee, taper thread, bronze plug with stainless steel round cover and vandal-proof screw

2.13 WATER METER (NOT USED)

2.14 STRAINER (NOT USED)

2.15 FUNNEL DRAIN (NOT USED)

2.16 WATER CLOSET (P-1)

1. American Standard Model No. 2403.128, 1.5 Afwall Millennium FloWise vitreous china, water saver type, ADA compliant, floor mounted type (1.1-1.6 gpf), American Standard Model No. 3353101.020, wall mount type (1.6 gpf), or approved equal

2. Flush valve shall be similar to Zurn Aquasense model #ZEMS6000PL-HET-IS-P6000-HW6 or Sloan Royal model #111-1.28 ES-S (1.28 gpf). Valve shall be sensor-operated, hard-wired high efficiency type. Inside Wall Flushometer shall be similar to Sloan Royal Sellenoid Model No. 140-1.6 ESS/Product Code 3451103. Outside Wall Flushometer shall be similar to Sloan Regal Model No. A-38-A. Flushometer shall be ADA compliant, polished brass chrome plated assembly, hardwired and equipped with automatic sensor flush technology. Flush valve shall be quiet, exposed, using infrared sensor with range adjustment and a true manual override push-button. Valve shall comply with ASSE 1037 & 1001. Provide power converter/step down transformer from flush valve manufacturer.

Valve shall contain adjustable tailpiece and be chloramine resistant. Other valve accessories shall include, vacuum breaker, and 1" adjustable angle stop with protective bumper. Flush connection and coupling for 1½" top spud shall include wall and spud escutcheons. Contractor shall verify flow requirements with the manufacturer of the selected flushometer to ensure that the valve will work with the selected toilet bowls

3. Seat — Shall be Bemis Model No. 1955 CT 000 or Church Model No. 295C elongated, open front, solid plastic.

2.17 WATER CLOSET (P-1A)

1. Same as P-1 except mount at ADA height. For height requirements refer to architectural drawings.

2.18 URINAL (P-2A)

1. Urinal shall be wall hung, 3/4" top spud, siphon jet or washout, 0.125 (1/8) gallons per flush, vitreous china. Urinal shall be American Standard 6590.1250.125gpf, Crane Plumbing 7399.125, Kohler K-4904-ET, Mansfield #422., Sloan Model SU-1000-0.125, Zurn Z5798.207.00.

2. Flush valve shall be similar to Zurn Aquasense model #ZEMS6003AV-ULF-IS-VP-P6000-HW6 or Sloan Regal model #186-0.125 SFSM HW other approved equal. Inside Wall Flushometer shall be similar to Sloan Royal Sellenoid Model No. 140-1.6 ESS/Product Code 3451103. Outside Wall Flushometer shall be similar to Sloan Regal Model No. A-38-A. Contractor shall verify flow requirements with the manufacturer of the selected flushometer to ensure that the valve will work with the selected urinals.
3. Floor mounted carrier support shall be high strength steel uprights with welded feet, top support and bottom bearing plates, both adjustable and mounting fasteners Carrier must be similar to: Josam Co 17560-UR, Zurn Z1222, MIFAB MC-32, Wade 400-AM11-M36, Watts Drainage Products CA-321 or Jay R. Smith. All standard urinals and barrier-free fixtures from Kholer shall be supported by Jay R. Smith Figure 637-M31; barrier free units from American Standard: Jay R. Smith Figure 644-M31 and all units from Crane: by Jay R. Smith Figure 637M-M31.

2.19 DRINKING FOUNTAINS (P-3 & P-3A)

1. Single bubbler wall mounted drinking fountain shall be designed to meet the clearances required by ANSI A117.1 and ADA. Fountain shall be made from 14-gage, type 304 stainless steel with a satin finish. All seams shall be welded and ground smooth. Interior of unit shall be coated with a fire and moisture resistant sound deadening material. Unit shall have a strainer and a valve regulator assembly. Receptor drain shall be of the 90° angle type. All waterways shall be constructed of copper. Unit shall be furnished with a bottom plate secured with vandal resistant screws. Furnish a screwdriver for removing bottom plate screws. Bubbler shall be polished chrome plated forged copper-zinc alloy with shielded anti-squirt angle stream with integral receptor shank for vandal-resistant mounting using locknut and washer, Haws Model 5703M or an approved equal. Unit shall be Elkay EHWM214C, Acorn AquaContour A151400-FG, Willoughby Industries DF-1812-FA-ASDB-PS1-PPB-

MOD, Halsey Taylor HDFEBP-VR or Oasis F140PM-14GA With Back Panel. All bubblers shall meet the requirements of the federally mandated "Reduction of Lead in Drinking Water Act". Regardless of model numbers indicated herein, provide equivalent models that meet the requirements of the act.

2. Provide Josam Co., J. R. Smith Figure 824-M31 or Wade 420-M36 floor mounted chair carrier. Floor mounted hanger plate carrier using rectangular high-strength steel uprights welded to base plates.

2.20 SINGLE LAVATORY (P-6).

1. Barrier-free Lavatory shall be 22" x 21", vitreous china, with 4" center faucet holes and shroud/knee contact guard. Lavatory shall be Mansfield Plumbing Products #2040 complete with vitreous china shroud, Zurn Z5324-PED, Crane Plumbing Serena 179V**,** Sloan model #SS-3065, Zurn 20x18 Wall Hung Lavatory sink Model No. 25344 4" centers, or Kohler Chesapeake wall mounted lavatory sink model No. 1729-0. Provide with holes for concealed arm carrier systems. Color: white.

2. Faucet shall be sensor-operated, power source shall be hard-wired ADA compliant faucet. The control of the faucet's operation shall utilize infrared convergence-type proximity for detection. Faucet shall be chrome-plated, battery operated. Faucet's flow performance rating shall be 0.5 gpm. Provide local mixing valve to ensure that tempered water is delivered at the appropriate temperature for hand-washing. Acceptable electronic hand washing faucets shall be Speakman Antiligature faucet sensor faucet Model No. sal-501, Delta 8" Spreads Faucet, Zurn model #6955-XL-S-F-15S, Sloan Model #EAF 350 or Chicago model #116CR44813 or T&S EC-3103-LMV-VF05. Local mixing valve/temperature limiting device to be associated with electronic hand washing faucets.

3. Lavatory/Hand Sinks support: floor-mounted, concealed arms with positive mechanical locking device, arms fully adjustable, high-strength steel uprights with welded feet and supporting brackets: Josam Co. 17100, MIFAB MC-42, Zurn Z1231-EZR, Wade 520-M36, Watts Drainage Products TCA-411 or Jay R. Smith Figure 700-M31.

2.21 KITCHEN SINK (P-4)

1. Elkay Model No. LRAD-2522, 18 gauge with (3) faucet holes (for ADA access).

2. Elkay Model No. LR-2522 with (3) faucet holes.

3. Faucet shall be American Standard Model No. 4275.550F15 (1.5 GPM) kitchen faucet, less hand spray with escutcheon plate.

4. LKAD-35 basket and body with LKAD-OS offset tailpiece.

5. 2" x 11/2" Chrome plated cast brass P-trap with cleanout and 2" C.P. trap nipple with cast brass set screw escutcheon as manufactured by Kholer Model K-8997, McGuire 1207, EBC TN190 or Zurn Z8718-PC

2.22 JANITOR UTILITY SINK (P-5)

1. Service sink shall be nominally 22" by 18" by 13" deep and shall be enameled cast iron with at least a 10" high plain backsplash. Service sink shall have a stainless steel rim guard, continuously covering both sides and front rim. Service sink shall be Chicago Faucet Wall Mounted Slop Sink Model No. 835934, Eljer 242-0120, Kohler K-6718, or Zurn Z5888.

2. Trap shall be 2" cast iron with threaded outlet and chrome plated brass strainer drain. Trap shall be "P" type with front cleanout plug and flange floor stand. Trap to be enameled on the inside. Trap shall be Eljer 804-1040, Kohler K-6772 or Zurn Z5900-IP2.

3. Combination faucet, four arm handles, lockshield stops on hot and cold inlets. Refer to the Faucet Article. Provide a thermostatic mixing valve for tempered water. Mixing valve to be installed at the point of use and shall be similar to Acorn model #ST70, Powers LFe480-01 or other approved equal. Mixing valve shall comply with ASSE 1070.stops.

4. Floor-mounted fixture support with acid resistant coating and a fixture mounting plate to receive the fixture manufacturer's hanger device, high-strength steel uprights with welded feet and supporting brackets. Carrier shall be similar to J. R. Smith Figure 851-M31, Watts Drainage Products ISCA-560 and Wade 640-M36 or Zurn Z1218.

2.23 MUSEUM UTILITY SINK (P-8)

1. Non barrier-free art room trough sink unit shall be Sheldon 77855 (or the approved equal)

2. Unit shall be fitted with one (1) combination hot and cold faucet with handles indexed "hot" and "cold".

3. Provide a thermostatic mixing valve for tempered water. Mixing valve to be installed at the point of use and shall be similar to Acorn model #ST70, Powers LFe480-01 or other approved equal. Mixing valve shall comply with ASSE 1070.

4. Sink strainer shall be type 304 stainless steel to fit 3½"" bowl opening with 1½"" tailpiece: Elkay LK-18B or Just J 35SSF.

5. Stop valves 1/2" angle type.

6. Combination faucet shall be wall mounted, chrome plated cast brass with a 8" adjustable centerline, gooseneck with a vacuum breaker, four arm handles, vandal resistant serrated tip with 0.5 gpm flow control. The vandal resistant serrated tip with 0.5 gpm flow control shall the similar to T&S Brass and Bronze Works B-0198-F05. The faucets shall be T&S Brass and Bronze Works BL-5725-08 with B-0198-F05, Zurn Aquaspec Z842U2-HCT-6MF with vandal resistant serrated tip with 0.5gpm flow control, Moen 8121-SV003-NYCSCA with vacuum breaker spout and vandal resistant serrated tip with 0.5gpm flow control, Chicago Faucets 943 with vandal resistant serrated nozzle with 0.5gpm flow control WaterSaver Faucet Co. L511VB-WS with vandal resistant serrated tip with 0.5gpm flow control or Component Hardware Group (CHG) KN54-8153-KT2 with vandal resistant serrated tip with 0.5gpm flow control.

2.24 WATER HAMMER ARRESTORS

1. Provide engineered water hammer arresters where required and/or shown on the Drawings.
2. Engineered water hammer arresters shall conform to Plumbing and Drainage Institute Standard PD1-WH201 and ASSE Standard 1010. They shall be sized and installed in accordance with manufacturer's instructions. Engineered water hammer arresters by Josam, J. R. Smith, Zurn, Sioux Chief, MIFAB, Wilkins, Wade and Watts, Quiet Pipes by Oatey and FNW, Fig X10P & X11P will be accepted.

2.25 LATEX CEMENT GROUT

A. All cement grout used on plumbing fixture installations shall comply with the South Coast Air Quality Management District (SCAQMD) Rule #1168; VOC limits shall comply with the limits indicated in Table 1 of LEED Version 3.0, Indoor Environmental Quality Section, Credit IEQ-4.1. Those limits correspond to an effective date of the SCAQMD Rule #1168 of July 1, 2005, and Rule Amendment date of January 7, 2005.

B. Latex Portland cement grout compound shall be a compound of Portland cement grout and latex additive complying with ANSI A118.6.

2.26 SEALANT, SILICONE

A. All sealants used on plumbing fixture installations shall comply with the South Coast Air Quality Management District (SCAQMD) Rule #1168; VOC limits shall comply with the limits indicated in Table 1 of LEED Version 3.0, Indoor Environmental Quality Section, Credit IEQ-4.1. Those limits correspond to an effective date of the SCAQMD Rule #1168 of July 1, 2005, and Rule Amendment date of January 7, 2005.Silicone sealant shall be one-part mildew resistant silicone sealant by Dow Corning 786 or General Electric Sanitary 1700, color white.

2.27 VANDAL PROOF HOODED VENT CAPS

A. Vandal Proof Hooded Vent Cap: cast iron body with dome cap and vandal-proof securing device shall be one of the following: Jay R. Smith Fig. 1748,Zurn Z193, Josam 26700, MIFAB R1930, Watts Drainage Products RD-680-VC, Wade 3690 .

PART 3 - EXECUTION

3.1 SERVICES TO FIXTURES AND EQUIPMENT FURNISHED UNDER OTHER SECTIONS

A. The list of equipment for the project shall be reviewed by this Contractor, who shall include in the Contract price the costs for installing all equipment as herein specified and as claimed by the Trade Unions as Plumbing Work.

B. Refer to Architectural and Plumbing Drawings for exact locations of equipment and fixtures. Provide all materials, equipment and appliances necessary and required to complete all work, including but not limited to the following: plumbing, roughing and final connections, valves, stops, trim, escutcheons, fittings, traps, etc.

C. Unless otherwise detailed on Drawings, roughing of proper size and capacity for equipment indicated on Architectural, Heating and Ventilation, Plumbing or Electrical Drawings or provided under another Division or Section shall be provided and installed in such a manner and location that final connection can be made with a minimum of work and without cutting, patching permanent walls, partitions, ceilings or floors. Drawings are of necessity, schematic, for special equipment as exact roughing and requirements may vary with different manufacturers.

3.2 INSTALLATION REQUIREMENTS

A. The Contractor shall make all plumbing connections to all equipment and fixtures requiring such connections as shown on Drawings whether the equipment and fixtures are furnished under this Section or another Division or Section. Investigate the equipment furnished under other Divisions or Sections to determine if combination fittings have a means of shut-off or require the installation of check valves, backflow preventors and/or pressure reducing valves. Make final connections to such, including installations of all special traps, supplies, control valves, etc. furnished with such equipment, and furnish all material necessary that is not supplied with the equipment. Seal all pipe penetrations thru wall or floor.

B. The Contractor shall leave valved water connection for equipment, spaces and other locations where shown for the use of other trades or other Sections. On each valved outlet for equipment with submerged inlets, provide a backflow preventor after the shut-off valve. Funnel drains and/or floor drains for the air conditioning, heating and refrigeration work shall be provided.

C. Fixture supplies and traps as specified, shall be chrome plated brass where exposed to view. Where concealed from view in cabinets, etc., they may be rough brass. All fixture supplies shall have stops.

D. As soon as installed, all metal fixture trimming shall be thoroughly covered by this Contractor with non-corrosive grease which shall be maintained until all construction work is completed.

E. Upon the completion of the Work, all fixtures and trimmings shall be thoroughly cleaned and polished and free from all marks and left in first-class condition.

F. Upon completion of the Work, test flush valves and faucets for leaks or drips and adjust same for quiet operation.

G. All fixtures shall be left thoroughly clean. All plated or polished fittings, pipes and appliances shall be coated with Vaseline immediately after installation, and shall be finely polished and free from all marks and foreign substances.

H. Equipment and all connections shall be in accordance with the rules relative to submerged inlets and shall be provided with all necessary vacuum breakers and check valves in accordance with the applicable codes.

I. Connection between any fixture with a floor outlet and flange shall be made with an approved prepared gasket that shall be a germicide, absolutely gas and fume-proof, watertight, stainproof, containing neither oil nor asphaltum, and which will not rot, harden or dry under any extreme climate change and must adhere on wet surfaces.

J. Each fixture shall be separately trapped, using the type and size of trap called for specifically in the Specifications or the type required by the Plumbing Code. The traps shall be approved type.

K. All fixtures requiring hot and cold water shall have the cold water faucet on the right hand side of the fixture and the hot water faucet on the left hand side of fixture.

L. The Contractor shall be responsible for protecting all plumbing fixtures, equipment, etc., provided under Plumbing Work Sections against injury from building materials, acids, tools and equipment.

M. No slip joints will be permitted on water piping.

N. Flexible supplies will not be permitted in lieu of rigid supplies.

O. Double complaint sinks or lavatories shall be provided with faucet, trap, supplies, etc. for each compartment.

END OF SECTION 22 42 00