
SECTION 22 00 00

PLUMBING SYSTEMS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Conform to General and Supplementary Conditions, the modifications thereto and Division 1 General Requirements for all work in Division 22.
- B. Plans take precedence. Where conflict between specification and plans, plans shall take precedence.

1.2 SCOPE OF WORK

- A. Provide labor, materials and appliances and satisfactory installation of plumbing work ready to operate in accordance with these specifications. Work includes, but is not limited to, that as delineated in this specification section and on the architectural, civil, landscape, and structural drawings.
- B. Coordinate all plumbing requirements with architect before ordering or installing any plumbing components.
- C. Utilities (Waste, Water, Storm, Gas)
 - 1. Provide utilities connections as indicated on plans. Coordinate with Civil.
 - 2. Coordinate connections and meters with utilities.
 - 3. Fees will be paid to gas utility directly by owner.
- D. Waste and Vent
 - 1. Provide all new waste and vent system as indicated on plans.
- E. Storm Drainage
 - 1. Trenching, backfill and compaction for under-slab piping will be done by general contractor.
 - 2. Provide rainleaders and overflow drain piping as indicated on plans.
 - 3. Provide roof drains, overflow drains, deck drains, and planter drains as shown on drawings. Anticipate a roof, deck, and planter drain at each such area whether indicated on the architectural drawings or not.
- F. Domestic Water
 - 1. Provide all new domestic cold and hot water piping as indicated on plans.
 - 2. Provide water shut-off valves for each common area. Shut-off valves are indicated on plans. Include contingency for 10% additional valves.
- G. Fixtures – Provide as follows:
 - 1. All new plumbing fixtures as scheduled and where shown on plans.
 - 2. Hose Bibbs: As shown on plans.

3. Floor drains and sinks where shown.
4. Provide connections to Owner-furnished kitchen equipment.
5. Floor drains and floor sinks where required to pick up condensate and relief drains.
6. Floor drains in common laundry room, mechanical rooms, and where indicated on architectural plans.
7. Hub drain for fire riser testing. Coordinate location with Fire Sprinkler Contractor.

H. Gas Piping

1. Steel pipe, ASTM A53, Schedule 40 black screwed black steel up to 2 ½ inches; welded pipe for 3 inches and larger, OR copper tubing, Type L hard drawn.
2. Gas piping from meter to central domestic water heaters, mechanical equipment, and all other gas appliances.

I. General

1. Trenching, backfill and compaction for under-slab piping to be done by general contractor.
2. Warrant materials and workmanship for one year.
3. Vibration and noise isolation requirements:
 - a. Piping shall be installed in partition walls that separate non-acoustically sensitive areas (i.e. bathrooms) and circulation.
 - b. For piping 1 inch and larger, shield insulation with metal wrap at each support. Supports shall not touch pipe.
 - c. Where pipes pass through a wall/floor, the hole shall be oversized by 1 inch, stuffed with fiberglass and sealed with fire caulk. No contact with the wall/floor is allowed.
 - d. Domestic supply lines shall be fed through standard plastic isolation grommets at all stud penetrations.
 - e. Water flow velocities shall not exceed 8 feet per second for cold, 5 feet per second for hot. Notify engineer where this criteria may be exceeded.
4. Low VOC Adhesives and Sealants throughout.

1.3 PROPOSAL AND SELECTION

- A. Proposals shall contain, but not be limited to, the following data:
 1. Basic contract price for systems described herein.
 2. Adjustments to contract price for alternates.
- B. Contractors are invited and encouraged to develop and submit for consideration alternates to the basic systems and sub systems. Contractor shall include costs for redesign, plan revisions and permit resubmittal in their alternate pricing.

1.4 CODES AND STANDARDS

- A. If any conflict occurs between legally adopted codes and this specification, the codes are to prevail; this shall not be construed as relieving the Contractor from complying with any requirements of the plans or specifications which may be in excess of code requirements and not contrary to same.

- B. Conform to code and agency requirements having jurisdictional authority over installation. Refer to plans for list.

1.5 FINAL CONSTRUCTION APPROVAL

- A. Completion and approval of the following is required for final approval of systems.
 - 1. Execution of Architect's and Engineer's final observation reports.
 - 2. Operation and maintenance instruction.
 - 3. Operation and maintenance manuals submitted.
 - 4. Equipment cleaning and piping sanitation flush.
 - 5. Record drawings submitted.
 - 6. Testing & Balancing Report submitted.
 - 7. Preliminary Commissioning Report submitted.
 - 8. Final Commissioning Report submitted.

1.6 DOCUMENTATION

- A. Product Submittals: Within thirty (30) calendar days (or as required by Division 1) after contractor's receipt of Owner's Notice to Proceed, submit in PDF format:
 - 1. Organized PDF electronic file that includes relevant catalog data for all piping, insulation, hanger systems, parts and accessories, fixtures, and equipment in accord with Division 1.
 - 2. Unless otherwise indicated, material and equipment to be submitted includes all items specified in Part 2 (Products) in each section of Division 22 and as listed on equipment schedules on drawings, and/or necessary to complete the work.
 - 3. Clearly indicate on each page the equipment schedule designation, as applicable, and model intended for use.
 - 4. Do no fabrication or manufacture any products until return of approved submittals.
- B. Provide shop drawings for all products, systems, system components, and special supports which are not a standard catalog product and which may be fabricated for the Contractor or by the Contractor. Lay out drawings to scale and show dimensions where accuracy of location is necessary for coordination or communication purposes.
- C. The word "provide" in the drawings and specifications shall be understood to mean "furnish and install complete and operational".
- D. Permits: Submitted for, paid for, and obtained by Contractor. Submit copies of signed, approved permits to the Architect. See Supplementary Conditions.
- E. Record Drawings: See Division 1. Provide two sets of record drawings. Show location of equipment and size of piping and ductwork. Locate all valves, cocks, dampers, and similar equipment. Maintain one set of mark-up plans on the job site with up-to-date redline as-built information. Engineer shall have access to plans upon request during site visits.

- F. Operating and Maintenance Manuals: Furnish three (3) copies of operating and maintenance manuals. Manual shall be hard-cover loose-leaf with index and tabbed Sections. Manual shall include the following:
 - 1. Manufacturers, suppliers, and subcontractors' names, address, and phone numbers.
 - 2. Schedule and description of routine maintenance for each component to include oiling, lubrication and greasing data, and belt sizes, types and lengths.
 - 3. Balancing and test data.
 - 4. Part numbers of all replaceable items.
 - 5. Written guarantees.
 - 6. As-built Record drawings corrected and completed.
 - 7. Copies of manufacturer's warranties on equipment.
 - 8. Equipment submittals.
- G. Operation Instruction Period: Conducted by Contractor during minimum eight (8) hour period. Deliver and post all operation and maintenance instructions at this time.

1.7 ELECTRICAL

- A. Power Wiring: By Electrical Contractor.
- B. Control Wiring for Plumbing: By Division 22. If line voltage control wiring is required, include an allowance for same.
- C. Owner will not entertain additional cost requests due to lack of coordination between Division 22 and Electrical Contractor.

1.8 WARRANTY

- A. Warrant materials and workmanship for one year in accord with the General and Supplementary Conditions. Provide written guarantees which exceed one year such as on domestic hot water heater and similar items. Submit with Maintenance and Operating Manual. Warranty period to extend from date of substantial completion.

1.9 EMERGENCY SERVICE

- A. The subcontractor shall provide a twenty-four (24) hour emergency telephone number for all warranty work related to their contract. The subcontractor shall complete all emergency service work with the same day of notice.

1.10 COORDINATION OF WORK

- A. Coordinate installation to preclude interference between trades. Conflicts shall be brought to the attention of the Architect prior to installation.
- B. Insure proper "rough-in" on all equipment to which connections are made.

1.11 LUBRICATION

- A. Lubricate all moving parts per manufacturer's recommendation. Replace ruptured seals caused by excessive lubrication. Attach service record label with space for future service to all major equipment.

1.12 CUTTING AND PATCHING

- A. Coordinate all cutting and patching necessary to install work. Patching shall match adjacent surfaces.

1.13 TESTING AND BALANCING

- A. Testing of plumbing systems shall be performed as described in following sections and as required by the various codes and ordinances. Hot water systems shall be operational a minimum of two (2) weeks prior to hotel opening.

1.14 COMMISSIONING

- A. Assist and coordinate commissioning work.

PART 2 - PRODUCTS**2.1 PLUMBING FIXTURES**

- A. Provide as scheduled on plans.

2.2 WATER PIPE AND FITTINGS

- A. As indicated on plans.
- B. In guestrooms, provide manifold at each dwelling unit with home run PEX piping to each fixture. PEX piping is only acceptable if configured with an individual manifold behind an access panel (by Division 22) with "home run" piping from manifold to each individual plumbing fixture connection.

2.3 WATER HAMMER ARRESTORS

- A. Factory fabricated, PDI certified unit with stainless steel construction and nitrogen charge. MIFAB, Wade Shocktop, or approved.

2.4 THERMOSTATIC MIXING VALVES

- A. As indicated on plans.

2.5 IRRIGATION EQUIPMENT

- A. Provide RPBP and connection to irrigation equipment as indicated on plans.

2.6 CLEANOUTS

- A. Wade models listed or approved equal by MIFAB, Zurn, J.R. Smith or Josam.

Floor Cleanout	6000-2-75	bronze tapered thread plug
Floor Cleanout	6000-TS-1	use in tile floors
Floor Cleanout	6000-2-72	with carpet marker
Wall Cleanout	8590-E/R	bronze plug chrome cover

2.7 FLASHING AND COUNTERFLASHING

- A. 3 lb. lead soldered joints and seams, 24x24 base pad and counterflashed into pipe. 10x10 lead base pad flashed into pipe or re-manufactured neoprene flashing sealed water tight.

2.8 FIXTURE SUPPLIES

- A. Install for all required fixtures, equal to Speedway Flexible Supplies TR39A or similar fixed key angle stop type as applicable to specific fixtures.

2.9 TRAPS

- A. Adjustable type, plastic, as applicable to specific fixture. ADA compliant in all handicapped accessible units.
- B. Provide trap primers on all floor drains (not residential shower drains). Provide access to primer valves. MIFAB, J.R. Smith, Josam, Wade, or Zurn.

2.10 FIXTURE SUPPORTS

- A. Provide concealed arm carriers for all wall-hung lavatories. Wade, or approved equal by J.R. Smith, Zurn, Watts, Josam, or MIFAB.

2.11 CONDENSATE DRAINS

- A. Plastic DWV with solvent cement joints if approved by jurisdiction or Type M copper pipe with 50/50 solder joints.

PART 3 - EXECUTION

3.1 WATER SYSTEMS

- A. Provide connection to site water mains in accord with civil engineer.

- B. Grade: Grade piping to drain at low points. Provide drain with ball valve if low point is not at plumbing fixture.
- C. Exterior Walls: Install water piping on interior side of building insulation.
- D. Water Hammer Arrestors: Install on hot and cold water of each fixture group (e.g.: one arrestor may serve each service to a toilet). Select unit sizes and install in accord with PDI Standard WH-201.
- E. Cleaning: Clean pipe prior to testing by thoroughly flushing with water until all dirt and foreign materials have been removed. Maintain flushing operations for not less than one hour and until piping is clean. Not less than 80 psi flushing pressure.
- F. Sterilization: Sterilize pipe with chlorine before acceptance. Apply amount of chlorine such as to provide a dosage of not less than 50 parts per million. After a contact period of not less than 8 hours, flush system with clean water until residual chlorine content is not greater than 0.2 parts per million. Open all valves in lines being sterilized and close several times during contact period.
- G. Testing; Test pipe for a period of not less than 4 hours at 50 psig above building operating pressure, 110 psig minimum.
- H. Condensate Drainage: Provide minimum 3/4 inch condensate drain lines at each piece of cooling equipment. Provide minimum 4 inch deep p-trap.

3.2 WASTE AND VENT SYSTEM

- A. Service Connections: Provide connections to site mains as indicated on drawings.
- B. Grade: Grade at 1/4 inch per foot. Where needed and with authorization of plumbing inspector, grade no less than 1/8 inch per foot. Install all main vertical soil and waste stacks with provisions for expansion and extend full size to roof line as vents.
- C. Buried Soil & Rainleader Piping: Backfill with pea-gravel if available at site for other purposes. If pea-gravel is unavailable, native soil may be used for backfill if all the following conditions are met:
 - 1. All broken concrete and sharp stones (+1 inch diameter) to be removed from backfill soil.
 - 2. All large stones (3 inches diameter or bigger) to be removed from backfill soil.
 - 3. Piping shall be bedded on minimum 2 inch thickness of replaced "rock free" soil and then checked for grade.
- D. Vents: Flash and counterflash. Install vents passing through roof with roof flashing and counterflashing assemblies.
- E. Floor and Trench Drains: Trapped and vented. Install automatic primers throughout.
- F. Cleanout: Provide every 50 feet and provide at all locations required by code and to permit cleaning of all waste piping. Provide cleanouts full size of pipe, but not larger than 4 inches. Coordinate with Architect when cleanouts are located in finished rooms. Install

cleanout threads with graphite. Locate cleanouts to clear cabinet work and to be easily accessible.

- G. Testing: Subject all work to hydrostatic test of 10 feet head of water. Notify Architect at least 2 normal working days prior to testing.
- H. Approvals: Obtain written approval of local plumbing authority prior to covering or concealing any work.

3.3 PLUMBING FIXTURES

- A. Provide fixtures as scheduled on plans.
- B. Exposed Piping at Fixtures: Chromium plated, satin nickel or brass finish as determined by interior designer / Architect.
- C. Counter-Top Sink: Verify with cabinet supplier prior to ordering.
- D. Fixtures and Equipment: Furnish all traps, valves, tailpieces, and other trim not furnished with equipment. For wall mounted ADA fixtures, install at compliant height given by Architect. For all lavatories and sinks, verify required number of holes and hole spacing before ordering. Provide required extensions, clamps, and rain styles to match specific floor or roof construction.
- E. Fixtures: Locate in accordance with details on architectural drawings, structural drawings and/or Engineer's direction in field.
- F. Fixtures and Equipment: Provide floor-mount concealed arm hangers for all wall mounted fixtures. Align fixtures and equipment in accord with architectural drawings. Fit fixtures on finished walls without noticeable warpage on either the wall or fixture, and grout with G.E. silicone or similar approved material.
- G. Water connections: Install individual fixed key stops on all fixtures. If water connections are concealed, provide valves in lieu of stops.
- H. Fixture Connections (including water, soil, waste, and vent): In accordance with rough-in details of manufacturer.

END OF SECTION