SECTION 220500 - PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following:

1. Demolition
2. Storm drainage system
3. Drain, waste and vent systems
4. Domestic hot and cold water piping systems
5. Plumbing fixtures, trim and accessories

B. Related Requirements:

1. Division 024119 Section "Selective Demolition" for demolition of existing plumbing lines and fixtures.

1.2 ACTION SUBMITTALS

A. Materials list of items proposed to be provided under this Section.

B. Product Data: For each type of product.

C. Shop Drawings:

1. Include plans, elevations, sections, and mounting attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 PIPE SCHEDULE

A. Sanitary - waste and vent lines:

1. Plastic Pipe Schedule 40 DWV PVC 1120.

B. Storm Drainage:

1. Plastic Pipe Schedule 40 DWV PVC 1120.

C. Water System (domestic piping):

1. Above ground, PEX:

a. Basis-of-Design: Subject to compliance with requirements provide piping by Zurn or other manufacturer providing tubing capable of meeting the 25/50 flame spread/smoke spread developed requirement in general accordance with UL733/ASTM E84 and labeled suitable for plenums.
b. Where PEX lines are greater than 1-inch, provide tubing meeting the requirements above with minimum 1/2-inch thick fiberglass insulation listed to ASTM E84 and supported every 24-inches.

2. Below ground, Type "K" copper with sweated connections.

D. Gas piping:

1. Schedule 40 black steel pipe with malleable iron screwed fittings, except provide galvanized where pipe or fittings are exposed to weather.

2.2 MATERIALS

A. Plastic Pipe and Fittings:

1. Plastic pipe Schedule 40 DWC PVC 1120.

B. Galvanized or Black Steel Pipe:

1. Provide standard weight complying with ASTM A12.

C. Fittings:

1. For copper lines, provide copper fittings.

2. For plastic lines, provide Schedule 40 DWC PVC 1120 fittings.
3. For PEX lines, provide brass fittings meeting ASTM F877 and ASTM F1807.

2.3 VALVES

A. General Requirements

1. Drain valves shall be installed on all lines carrying liquids.
2. Drain valves shall have base connecting ends, and where necessary, caps.
3. Compression type valves shall not be used for drain valves.
4. All valves shall be readily located for ease of replacement, repair, or service.
5. No valve shall be installed with stem pointing down below horizontal without approval of Architect.
6. Name of manufacturer together with service and pressure markings shall be cast in body.
7. Provide shutoff valves at all branch connections to main, at all fixture groupings and in mains to sectionalize system.

B. Valve Listing:

TYPE	SIZE	BODY	ENDS	STEM	PRESSURE
Copper Pipe (3" and smaller) Gate Valve	to 2"	Bronze	Screwed	Rising	125 WSP 300 OWG
Gate Valve	2" & Up	Bronze	Screwed	OS & Y	125 WSP 200 OWG
Globe Valve	to 3"	Bronze	Screwed	Rising	150 WSP 300 OWG
Swing Gate Valve	to 2"	Bronze	Screwed	125 WSP	150 OWG

2.4 MANUFACTURERS

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

1. Hammond Valve Corp.
2. Jenkins.
3. Crane.
4. Or Architect approved equal. Equal products by other manufacturers must be approved by Architect prior to receipt of bids. See Section 012500 Substitution Procedures.

2.5 PIPE HANGERS

A. Provide hangers with supporting rods for water piping, soil and waste piping, and gas piping.

2.6 CLEAN-OUTS

A. Floors:

1. Provide cleanouts with round nickel-bronze top in finished room floors.
2. Provide cleanouts with round cast iron tops in unfinished room floors.
3. Provide "flush-with-floor" type cleanouts, with adjustable watertight covers.

B. Finished Walls:

1. Provide cleanouts with round chrome plated stainless steel access plate and screws.

C. Provide cleanout plugs.

2.7 ACCESS DOORS

A. Walls and Ceilings:

1. Provide 16 ga. stainless steel 16" x 16" flush panel lockable type with frames.
2. Milcor #3202 - 420 MS. Comparable by Smith and Josam acceptable.

2.8 TRAPS

A. Provide as required for all fixtures.

B. Provide floor drain traps with primers.

2.9 WATER HAMMER ARRESTOR

A. Provide Smith #5000 series, stainless steel. Comparable by Josam or Blake acceptable.

2.10 FIXTURES AND EQUIPMENT

A. In general, fixtures, fittings and accessories are listed as manufactured by American Standard unless noted otherwise. Comparable by Crane, Eljer and Kohler acceptable. Equal products by other manufacturers must be approved by Architect prior to receipt of bids. See Section 012500 Substitution Procedures.

B. Water Closets: (tank type, handicapped) **WC-1**

1. Same as above except 18" high bowl.

a. Basis of design: American Standard CadetPRO #215AA.004.

2. Toilet seat: White open front seat with cover. Olsonite, Bemis, Church or Beneke acceptable.

C. Lavatory: (wall hung) **LAV-1**

1. Provide vitreous china, American Standard Lucerne #0355.012 with wall hangers, stainless steel grid drain, necessary fittings including tail piece, supply pipes and stops.
2. Provide push button slow closing faucets with spouts and softflo aerator, Chicago Faucet Co. #802 A-333-SLO.

D. Sink: (self-rimming) **S-1**

1. Provide a single compartment 18 ga. Type 304 (18-8) stainless steel self-rim sink unit, Elkay #DLR-2222-10 with #LK-2200 combination faucets and spout, LK-99 drain assembly, adjustable "P" trap, tail piece, and supply pipes with key operated stops.

E. Electric Water Cooler: (wall hung, handicapped) **EWC**

1. Provide Halsey Taylor Model HAC8FS-BL-WF PV in standard color as selected by Architect.
2. Comparable by Ebco and Elkay acceptable.

F. Floor Drains **FD**:

1. Provide Smith Series #2010-B Duco Cast Iron Body. 3" outlet. 6" X 6" polished nickel bronze strainers.
2. Comparable units by Wade and Josam acceptable.
3. Provide traps and trap primers for drains.

G. Floor Sink **FS**:

1. Provide Josam Manufacturing Company, Series No. 49000 with half grate, nickaloy top and sediment bucket.
2. Comparable units by Jay R. Smith and Wade acceptable.
3. Provide trap and trap primer.

H. Hub Drain **HD**:

1. Provide Josam Company or Jay R. Smith, Inc. hub floor drain with open funnel type, or floor sink with integral trap.

I. Mop Sink:

1. Provide Zurn Z-1996-24 Mop Basin 24x24x10.
2. Mop Sink Faucet: Zurn Z843M1-RC-FC Service FCT with 2.0, Flow Tag 11A Bracket, and vacuum breaker; spout and service stops.

J. Roof Drains:

1. Provide cast iron roof drains of sizes noted on drawings. Wade 3500 series.
2. Comparable by smith and Josam acceptable.

K. Carriers:

1. Provide proper carriers for all wall hung fixtures.
2. Wade, Josam and Smith acceptable.

2.11 INSULATION

A. Insulate hot water lines with 1" thick Owens/Corning Fiberglass "25 ASJ/SSL".

B. Insulate domestic cold water piping, roof drains and horizontal runs of downspout same as above.

2.12 OTHER MATERIALS

A. Provide other materials, not specifically described out required for a complete and proper installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PLUMBING SYSTEM LAYOUT

A. Lay out plumbing system in careful coordination with Drawings, determining proper elevations for all components of system and using only minimum number of bends to produce a satisfactorily functioning system.

B. Follow general layout shown on Drawings in all cases except where other work may interfere.

C. Lay out pipes to fall within partition and wall cavities.

3.3 TRENCHING

A. Excavation shall be made to exact depth unless rock is encountered, then excavation shall exceed depth required in order to provide a suitable backfill to provide proper bedding for pipe to be installed.

B. Trenches shall be kept free of water and no piping will be installed in trenches until after bottom of trenches have been pumped and sufficiently dried-out to receive piping.

C. After installation and testing of piping has been completed and approved for backfill, backfill will be made with materials inside of building lines, drives, parking areas, etc., and shall consist

of sand grits or previously excavated material if this excavated material is determined by Architect to be suitable for reuse. Backfill shall be made and tamped in 8" layers maximum.

3.4 INSTALLATION OF PIPING AND EQUIPMENT, GENERAL

A. General:

1. Proceed as rapidly as building construction will permit.
2. Thoroughly clean items before installation. Cap pipe openings to exclude dirt until fixtures are installed and final connections have been made.
3. Cut pipe accurately, and work into place without springing or forcing, properly clearing windows, doors, and other openings. Excessive cutting or other weakening of building will not be permitted.
4. Show no tool marks or threads on exposed plated, polished, or enameled connections from fixtures. Tape all finished surfaces to prevent damage during construction.
5. Make changes in directions with fittings; make changes in main sizes with eccentric reducing fittings. Unless otherwise noted, install water supply and return piping with straight side eccentric fittings at top of pipe.
6. Run horizontal sanitary and storm drainage piping at a uniform grade of 1/4" per ft. unless otherwise noted. Run horizontal water piping with an adequate pitch upwards in direction of flow to allow complete drainage.
7. Provide sufficient swing joint, ball joints, expansion loops, and devices necessary for a flexible piping system, whether or not shown on Drawings.
8. Support piping independently at pumps coils, tanks, and similar locations, so that weight of pipe will not be supported by equipment.
9. Pipe drains from relief valves, air vents, and similar locations to spill over an open floor drain, or other acceptable discharge point.
10. Securely bolt all equipment, isolators, hangers, and similar items in place.
11. Support each item independently from other pipes. Do not use wire for hanging or strapping pipes.
12. Provide complete dielectric isolation ferrous and non-ferrous metals.
13. Provide union and shut off valves suitably located to facilities maintenance and removal of equipment and apparatus.

B. Equipment access:

1. Install piping, equipment, and accessories to permit access for maintenance. Relocate items as necessary to provide such access and without additional cost to Owner.
2. Provide access doors where valves, motors, or equipment requiring access for maintenance are located in walls or chase or above ceilings. Coordinate location of access doors with other trades as required.

3.5 PIPE JOINTS

A. Cooper tubing:

1. Cut square, remove burrs, and clean inside of female filling to a bright finish.

    a. Apply solder flux with brush to tubing.

b. Remove internal parts of solder-end valves prior to soldering.

2. Provide dielectric unions at points of connection of copper tubing to ferrous piping and equipment.
3. For joining copper tubing, use:

a. Water piping 3" and smaller: 95-5 solder;

B. Screwed piping:

1. Deburr cuts:

a. Do not ream exceeding internal diameter of pipe.
b. Thread to requirements of ANSI B2.1.

2. Use teflon tape on male thread prior to joining other services.

C. Plastic piping:

1. Comply with manufacturer's instructions and recommendations and with applicable industry standards, solvent-cemented joints, ASTM D2235 and ASTM F 402.

D. Leaky joints:

1. Remake with new material.
2. Remove leaking section and/or fitting as directed.
3. Do not use thread cement or sealant to tighten joint.

3.6 PIPE SUPPORTS

A. Support suspended piping with clevis or trapeze hangers or rods.

B. Space hangers and supports for horizontal steel pipes according to following schedule:

Pipe Size:	Maximum spacing on centers:
1-1/4" and smaller	8'-0"
1-1/2" to 3"	10'-0"

C. Space hangers and supports for horizontal copper tubing according to following schedule:

Tube Size:	Maximum spacing on centers:
Less than 1"	6'-0"
1" to 1-1/2"	7'-0"
2"	8'-0"

D. Provide sway bracing on hangers longer than 18".

E. Support vertical piping with riser clamps secured to piping and resting on building structure. Provide at each floor unless otherwise noted.

F. Provide insulation continuous through hangers and rollers, protect insulation by galvanized steel shield.

G. Arrange pipe supports to prevent excessive deflection, and to avoid excessive bending stress.

3.7 SLEEVES AND OPENINGS

A. Provide sleeves for each pipe passing through walls, partitions, floors, roofs, and ceilings.

1. For uninsulated pipe, provide sleeves two pipe sizes larger than pipe passing through, or provided a minimum of 2" clearance between inside and outside of pipe.
2. For insulated pipe, provide sleeves of adequate size to accommodate full thickness of pipe covering, with clearance for packing and caulking.

B. Caulk space between sleeve and pipe or pipe covering, using a non-combustible, permanently plastic, waterproof, non-staining compound which leaves a smooth finished appearance, or pack with fiberglass to within 2" of both wall faces, and provide waterproof compound described above.

C. Finish and escutcheons:

1. Smooth up rough edges around sleeves with plaster or spackling compound.
2. Provide 1" wide chrome or nickel plated escutcheons on all pipes exposed to view where passing through walls floors, partitions, ceilings, and similar locations.

a. Size escutcheons to fit pipe and a covering.
b. Hold escutcheons in place with setscrew.

3.8 CLEAN-OUTS

A. Secure Architect's approval of locations for cleanouts in finished areas prior to installation.

B. Provide cleanouts of same nominal size as pipes they serve.

C. Make cleanouts accessible. After pressure tests are made and approved, thoroughly graphite cleanout threads.

3.9 VALVES

A. Provide valves in water and sewage ejector systems. Locate and arrange so as to give complete regulation of apparatus, equipment, and fixtures.

B. Provide valves in at least following locations:

1. In branches and/or headers of water piping serving a group of fixtures.
2. On both sides of apparatus and equipment.
3. For shutoff of risers and branch mains.
4. For flushing system.
5. Where shown on Drawings.

C. Locate valves for easy accessibility and maintenance.

3.10 WATER HAMMER ARRESTOR

A. Provide water hammer arrestor on hot water lines and cold water lines.

1. Install in upright position at all quick closing valves, solenoids, isolated plumbing fixtures, and supply headers at plumbing fixtures and supply headers at plumbing fixture groups.
2. Locate and size as specified or as shown on Drawings and, where not shown, locate in accordance with Plumbing and Drainage Institute Standard WH-201.

B. Where fixtures are not protected by water hammer arrestor, provide 24" high air chambers on each water supply, properly sized and designed for maintenance and drainage.

3.11 BACKFLOW PREVENTION

A. Protect plumbing fixtures, faucets with hose connections, and other equipment having plumbing connection, against possible back-siphonage.

3.12 PLUMBING FIXTURE INSTALLATION

A. Installation:

1. Set fixtures level plumb according to roughing-in drawings.
2. Provide accessories, fittings, and connections in proper alignment with each fixtures and with each like fixture. Where fixtures are handicap accessible accessory, fitting, and connection heights shall meet accessibility guidelines.

    a. Install accessible, wall-mounted fixtures at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.

3. Grout wall and floor mounted fixtures watertight where fixtures are in contact with walls and floors.

3.13 DISINFECTION OF WATER SYSTEMS

A. Disinfect hot and cold water systems.

1. Upon completion of disinfecting secure and submit Certificate of Performance stating system capacity, disinfectant used, time and rate of disinfectant applied, and resultant residuals in ppm at completion.

B. When disinfection operation is completed, and after final flushing, secure an analysis by a laboratory approved by Architect, based on water samples from system, showing test negative for coliaerogene organisms. Provide a total plate count of less than 100 bacteria per cc, or equal to control sample.

C. If analysis results are not satisfactory, report disinfection procedures and retest until specified standards are achieved.

3.14 OTHER TESTING AND ADJUSTING

A. Provide personnel and equipment, and arrange for and pay costs of all required tests and inspections required by governmental agencies having jurisdiction.

B. Where tests show materials or workmanship to be deficient, replace or repair as necessary, and repeat tests until specified standards are achieved.

C. Adjust system to optimum standards of operations.

3.15 CLEANING AND PROTECTION

A. Clean exposed fixtures and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed fixtures.

C. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 220500

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