SECTION 221113 - FACILITY WATER DISTRIBUTION PIPING

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.

B. See Geotechnical and Environmental Reports provided by the Owner.

C. See Division 22 Section "Common Work Results for Plumbing."

D. See Division 31 Section "Earth Moving."

1.2 SUMMARY

A. This Section includes water-distribution piping and related components outside the building for water service and fire-service mains.

B. Utility-furnished products include water meters that will be furnished to the site, ready for installation. Water meters, check valves and services taps will be furnished and installed by the Contractor.

1.3 DEFINITIONS

A. NPDES: National Pollutant Discharge Elimination System

1.4 SUBMITTALS

A. Product Data and Certificates: For each type of product indicated, from manufacturer.

B. Shop Drawings: Detail precast concrete vault assemblies meters and indicate dimensions, method of field assembly, and components.

C. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.

D. Field quality-control test reports.

E. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

D. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

E. NSF Compliance:

1. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:

1. Notify Owner no fewer than three days in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service without Owner's permission.

1.7 COORDINATION

A. Coordinate connection to water main with utility company – Fulton County, Department of Water Resources.

PART 2 - PRODUCTS

2.1 DUCTILE IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.

1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
2. Gaskets: AWWA C111, rubber.

C. Grooved-Joint, Ductile-Iron Pipe: AWWA C151, with cut, rounded-grooved ends.

1. Grooved-End, Ductile-Iron Pipe Appurtenances:

a. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Anvil International, Inc.
2) Victaulic Company of America.

2.2 JOINING MATERIALS

A. Refer to Division 22 Section "Common Work Results for Plumbing" for commonly used joining materials.

B. Brazing Filler Metals: AWS A5.8, BCuP Series.

C. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.

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

2.3 PIPING SPECIALTIES

A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

B. Tubular-Sleeve Pipe Couplings:

1. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.

a. Standard: AWWA C219.

2.4 GATE VALVES

A. AWWA, Cast-Iron Gate Valves:

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 following:

a. American AVK Co.; Valves & Fittings Div.
b. American Cast Iron Pipe Co.; American Flow Control Div.
c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
d. Crane Co.; Crane Valve Group; Stockham Div.
e. East Jordan Iron Works, Inc.
f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
g. McWane, Inc.; Kennedy Valve Div.
h. McWane, Inc.; M & H Valve Company Div.
i. McWane, Inc.; Tyler Pipe Div.; Utilities Div.
j. Mueller Co.; Water Products Div.
k. NIBCO INC.
l. U.S. Pipe and Foundry Company.

2. Nonrising-Stem, High-Pressure, Resilient-Seated Gate Valves:

a. Description: Ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem, and stem nut.

1) Standard: AWWA C509.
2) Minimum Pressure Rating: 250 psig (1725 kPa).
3) End Connections: Push on or mechanical joint.
4) Interior Coating: Complying with AWWA C550.

3. OS&Y, Rising-Stem, Resilient-Seated Gate Valves:

a. Description: Cast- or ductile-iron body and bonnet, with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.

1) Standard: AWWA C509.
2) Minimum Pressure Rating: 200 psig (1380 kPa).
3) End Connections: Flanged.

B. UL/FMG, Cast-Iron Gate Valves:

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 following:

a. American Cast Iron Pipe Co.; American Flow Control Div.
b. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
c. Crane Co.; Crane Valve Group; Stockham Div.
d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
e. McWane, Inc.; Kennedy Valve Div.
f. McWane, Inc.; M & H Valve Company Div.
g. Mueller Co.; Water Products Div.
h. NIBCO INC.
i. U.S. Pipe and Foundry Company.

2. UL/FMG, Nonrising-Stem Gate Valves:

a. Description: Iron body and bonnet with flange for indicator post, bronze seating material, and inside screw.

1) Standards: UL 262 and FMG approved.

2) Minimum Pressure Rating: 175 psig (1207 kPa).
3) End Connections: Flanged.

3. OS&Y, Rising-Stem Gate Valves:

a. Description: Iron body and bonnet and bronze seating material.

1) Standards: UL 262 and FMG approved.
2) Minimum Pressure Rating: 175 psig (1207 kPa).
3) End Connections: Flanged.

C. Bronze Gate Valves:

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 following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Div.
d. Hammond Valve.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Red-White Valve Corporation.

2. OS&Y, Rising-Stem Gate Valves:

a. Description: Bronze body and bonnet and bronze stem.

1) Standards: UL 262 and FMG approved.
2) Minimum Pressure Rating: 175 psig (1207 kPa).
3) End Connections: Threaded.

3. Nonrising-Stem Gate Valves:

a. Description: Class 125, Type 1, bronze with solid wedge, threaded ends, and malleable-iron handwheel.

1) Standard: MSS SP-80.

2.5 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Tapping-Sleeve Assemblies:

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 following:

a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
b. East Jordan Iron Works, Inc.
c. Flowserve.
d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
e. McWane, Inc.; Kennedy Valve Div.

f. McWane, Inc.; M & H Valve Company Div.
g. Mueller Co.; Water Products Div.
h. U.S. Pipe and Foundry Company.

2. Description: Sleeve and valve compatible with drilling machine.

a. Standard: MSS SP-60.
b. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
c. Valve: AWWA, cast-iron, nonrising-stem, metal-seated gate valve with one raised face flange mating tapping-sleeve flange.

B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches (125 mm) in diameter.

1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

C. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

2.6 CORPORATION VALVES AND CURB VALVES

A. Manufacturers:

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 following:

a. Amcast Industrial Corporation; Lee Brass Co.
b. Ford Meter Box Company, Inc. (The); Pipe Products Div.
c. Jones, James Company.
d. Master Meter, Inc.
e. McDonald, A. Y. Mfg. Co.
f. Mueller Co.; Water Products Div.
g. Red Hed Manufacturing & Supply.

B. Curb Valves: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

C. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches (75 mm) in diameter.

1. Shutoff Rods: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.

2.7 WATER METERS

A. Water meters should be obtained from utility company – Fulton County, Department of Water Resources.

2.8 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

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 following:

    a. Ames Fire & Waterworks; a division of Watts Regulator Co.
    b. Conbraco Industries, Inc.
    c. FEBCO; SPX Valves & Controls.
    d. Flomatic Corporation.
    e. Watts Water Technologies, Inc.
    f. Zurn Plumbing Products Group; Wilkins Water Control Products Div.

2. Standard: AWWA C511.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 12 psig (83 kPa) maximum, through middle 1/3 of flow range.
5. Size: See Plumbing Plans.
6. Design Flow Rate: See Plumbing Plans.
7. Selected Unit Flow Range Limits: See Plumbing Plans.
8. Pressure Loss at Design Flow Rate: See Plumbing Plans.
9. Body: Bronze for NPS 2 (DN 50) and smaller; steel with interior lining complying with AWWA C550 or that is FDA approved stainless steel for NPS 2-1/2 (DN 65) and larger.
10. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
11. Configuration: See Plumbing Plans.
12. Accessories:

    a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 (DN 50) and smaller; OS&Y gate type with flanged ends on inlet and outlet of NPS 2-1/2 (DN 65) and larger.
    b. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.

B. Double-Check, Backflow-Prevention Assemblies:

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 following:

    a. Ames Fire & Waterworks; a division of Watts Regulator Co.
    b. Conbraco Industries, Inc.
    c. FEBCO; SPX Valves & Controls.
    d. Flomatic Corporation.
    e. Watts Water Technologies, Inc.
    f. Zurn Plumbing Products Group; Wilkins Water Control Products Div.

2. Standard: AWWA C510.

3. Operation: Continuous-pressure applications, unless otherwise indicated.
4. Pressure Loss: 5 psig (35 kPa) maximum, through middle 1/3 of flow range.
5. Size: See Plumbing Plans.
6. Design Flow Rate: See Plumbing Plans.
7. Selected Unit Flow Range Limits: See Plumbing Plans.
8. Pressure Loss at Design Flow Rate: See Plumbing Plans.
9. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 (DN 65) and larger.
10. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
11. Configuration: See Plumbing Plans.
12. Accessories: Ball valves with threaded ends on inlet and outlet of NPS 2 (DN 50) and smaller; OS&Y gate valves with flanged ends on inlet and outlet of NPS 2-1/2 (DN 65) and larger.

2.9 CONCRETE VAULTS

A. Description: Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C 857 and made according to ASTM C 858. All concrete vaults in the right-of-way or containing Fulton County meters or check valves must comply with all Fulton County standards and specifications.

1. Ladder: ASTM A 36/A 36M, steel or polyethylene-encased steel steps.

2. Manhole: ASTM A 536, Grade 60-40-18, ductile-iron traffic frame and cover.

   a. Dimension: 24-inch- (610-mm-) minimum diameter, unless otherwise indicated.

3. Drain: ASME A112.6.3, cast-iron floor drain with outlet of size indicated. Include body anchor flange, light-duty cast-iron grate, bottom outlet, and integral or field-installed bronze ball or clapper-type backwater valve.

2.10 FIRE HYDRANTS

A. Relocated fire hydrants will be installed by the contractor.

B. Dry-Barrel Fire Hydrants: Fire hydrants shall comply with Fulton County Department of Water Resources standards and specifications.

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 following:

   a. American AVK Co.; Valves & Fittings Div.
   b. American Cast Iron Pipe Co.; American Flow Control Div.
   c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
   d. American Foundry Group, Inc.
   e. East Jordan Iron Works, Inc.
   f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
   g. McWane, Inc.; Kennedy Valve Div.
   h. McWane, Inc.; M & H Valve Company Div.
   i. Mueller Co.; Water Products Div.

j. Troy Valve; a division of Penn-Troy Manufacturing, Inc.
k. U.S. Pipe and Foundry Company.

2. Description: Freestanding, with one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets, 5-1/4-inch (133-mm) main valve, drain valve, and NPS 6 (DN 150) mechanical-joint inlet. Hydrant shall have cast-iron body, compression-type valve opening against pressure and closing with pressure.

a. Standards: UL 246, FMG approved.
b. Pressure Rating: 250 psig (1725 kPa).
c. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
d. Operating and Cap Nuts: Pentagon, 1-1/2 inches (38 mm) point to flat.
e. Direction of Opening: Open hydrant valve by turning operating nut to left or counterclockwise.
f. Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.

C. Wet-Barrel Fire Hydrants: Fire hydrants shall comply with Fulton County Department of Water Resources standards and specifications.

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 following:

a. American AVK Co.; Valves & Fittings Div.
b. Jones, James Company.
c. McWane, Inc.; Clow Valve Co. Div. (Corona).
d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
e. Mueller Co.; Water Products Div.

2. Description: Freestanding, with one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets, NPS 6 (DN 150) threaded or flanged inlet, and base section with NPS 6 (DN 150) mechanical-joint inlet.

a. Standards: UL 246 and FMG approved.
b. Pressure Rating: 150 psig (1035 kPa) minimum.
c. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
d. Operating and Cap Nuts: Pentagon, 1-1/2 inches (38 mm) point to flat.
e. Direction of Opening: Open hydrant valves by turning operating nut to left or counterclockwise.
f. Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.

2.11 FIRE DEPARTMENT CONNECTIONS

A. Fire Department Connections: See plumbing plans and details for fire department connection specifications and product data. See below for additional information.

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 following:

a. Elkhart Brass Mfg. Co., Inc.

b. Fire End & Croker Corporation.
c. Guardian Fire Equipment, Inc.
d. Kidde Fire Fighting.
e. Potter Roemer.
f. Reliable Automatic Sprinkler Co., Inc.

2. Description: Freestanding, with cast-bronze body, thread inlets according to NFPA 1963 and matching local fire department hose threads, and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet; 18-inch- (460-mm-) high brass sleeve; and round escutcheon plate.

a. Standard: UL 405.
b. Connections: Two NPS 2-1/2 (DN 65) inlets and one NPS 6 (DN 150) outlet.
c. Inlet Alignment: Inline, horizontal.
d. Finish Including Sleeve: Polished bronze unless otherwise specified.
e. Escutcheon Plate Marking: See plumbing plans for marking details for each fire department connection.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

C. Do not use flanges or unions for underground piping.

D. Flanges, unions, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

E. Underground water-service piping NPS 6 to NPS 12 shall be any of the following:

1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed.
2. Ductile-iron, grooved-end pipe; ductile-iron, grooved-end appurtenances; and grooved joints.

F. Aboveground and vault water-service piping NPS 4 to NPS 12 (DN 100 and DN 300) shall be any of the following:

1. Ductile-iron, mechanical joint pipe; ductile-iron, mechanical joint fittings; and gasketed.
2. Ductile-iron, grooved-end pipe; ductile-iron, grooved-end appurtenances; and grooved joints.

G. Underground Water and Fire-Service-Main Piping NPS 8 to NPS 20 (DN 200 to DN 500) shall be any of the following:

1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed.

H. Aboveground and Vault Fire-Service-Main Piping NPS 4 to NPS 8 (DN 100 to DN 200) shall be any of the following:

1. Ductile-iron, mechanical joint pipe; ductile-iron, mechanical joint fittings; and gasketed.
2. Ductile-iron, grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints.

3.3 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for NPS 3 (DN 80) and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 (DN 50) and smaller installation.

B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Underground Valves, NPS 4 (DN 100) and Larger, for Indicator Posts: UL/FMG, cast-iron, nonrising-stem gate valves with indicator post.
2. Use the following for valves in vaults and aboveground:

   a. Gate Valves, NPS 2 (DN 50) and Smaller: Bronze, rising stem.
   b. Gate Valves, NPS 3 (DN 80) and Larger: AWWA, cast iron, OS&Y rising stem, resilient seated.

3.4 PIPING SYSTEMS - COMMON REQUIREMENTS

A. See Division 22 Section "Common Work Results for Plumbing" for piping-system common requirements.

3.5 PIPING INSTALLATION

A. Water-Main Connection: Contractor will make taps to the main.

B. Make connections larger than NPS 2 (DN 50) with tapping machine according to the following:

1. Install tapping sleeve and tapping valve according to MSS SP-60.
2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.

C. Comply with NFPA 24 for fire-service-main piping materials and installation.

1. Install copper tube and fittings according to CDA's "Copper Tube Handbook."

D. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

E. Bury piping with depth of cover over top at least 36 inches (915 mm), with top at least 6 inches (150 mm) below level of maximum frost penetration.

F. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.

G. Sleeves are specified in Division 22 Section "Common Work Results for Plumbing."

H. Mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."

I. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

3.6 JOINT CONSTRUCTION

A. See Division 22 Section "Common Work Results for Plumbing" for basic piping joint construction.

B. Make pipe joints according to the following:

1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
3. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
4. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.
5. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
6. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Refer to Division 22 Section "Common Work Results for Plumbing" for joining piping of dissimilar metals.

3.7 ANCHORAGE INSTALLATION

A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:

1. Concrete thrust blocks.
2. Locking mechanical joints.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
2. Fire-Service-Main Piping: According to NFPA 24.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.8 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.

C. MSS Valves: Install as component of connected piping system.

D. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

3.9 BACKFLOW PREVENTER INSTALLATION

A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.

B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.

C. Do not install bypass piping around backflow preventers.

D. Support NPS 2-1/2 (DN 65) and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

3.10 WATER METER BOX INSTALLATION

A. Install water meter boxes in paved areas flush with surface.

B. Install water meter boxes in grass or earth areas with top 2 inches (50 mm) above surface.

3.11 CONCRETE VAULT INSTALLATION

A. Install precast concrete vaults according to ASTM C 891.

3.12 FIRE HYDRANT INSTALLATION

A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.

B. Wet-Barrel Fire Hydrants: Install with valve below frost line. Provide for drainage.

C. AWWA Fire Hydrants: Comply with AWWA M17.

D. UL/FMG Fire Hydrants: Comply with NFPA 24.

3.13 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.

1. Increase pressure in 50-psig (350-kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig (0 kPa). Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.14 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Division 33 Section "Common Work Results for Utilities."

3.15 CLEANING

A. Clean and disinfect water-distribution piping per Fulton County Department of Water Resources standards and requirements and as follows, unless in conflict with Fulton County, Department of Water Resources specifications:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. For systems not connected to potable water supply, use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
3. For systems connected to potable water supply, use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:

    a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
    b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.

c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION 22 11 13

SECTION 221313 - FACILITY SANITARY SEWERS

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.

B. See Geotechnical and Environmental Reports provided by the Owner.

C. See Division 22 Section "Common Work Results for Plumbing."

D. See Division 31 Section "Earth Moving."

1.2 SUMMARY

A. Section Includes gravity-flow, nonpressure sanitary sewer outside the building, with the following components:

1. Pipe and fittings.
2. Nonpressure couplings.
3. Cleanouts.
4. Manholes.

1.3 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 15-foot head of water (45 kPa)

1.4 SUBMITTALS

A. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

B. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewer system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

C. Product Data and Certificates: For each type of product indicated, from manufacturer.

D. Operation and maintenance data.

E. Field quality-control reports.

PART 2 - PRODUCTS

2.1 DUCTILE-IRON, GRAVITY SEWER PIPE AND FITTINGS

A. Pipe: ASTM A 746, for push-on joints.

B. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.

C. Compact Fittings: AWWA C153, for push-on joints.

D. Gaskets: AWWA C111, rubber.

2.2 NONPRESSURE-TYPE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
2. For Concrete Pipes: ASTM C 443 (ASTM C 443M), rubber.
3. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
4. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded, Flexible Couplings:

1. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Ring-Type, Flexible Couplings: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.3 EXPANSION JOINTS

A. Ductile-Iron, Flexible Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. EBAA Iron, Inc.
b. Romac Industries, Inc.
c. Star Pipe Products.

2. Description: Compound fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections, rated for 250-psig (1725-kPa) minimum working pressure and for offset and expansion indicated.

2.4 CLEANOUTS

A. Cast-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.

1. Top-Loading Classification(s): Heavy Duty.
2. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.5 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints. All manholes are to be per Fulton County Department of Water Resources standard detail for dimensions and materials and as below if not otherwise indicated.
2. Diameter: 48 inches (1200 mm) minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
4. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (100-mm) minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.
5. Riser Sections: 4-inch (100-mm) minimum thickness, of length to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual FRP steps, FRP ladder, or ASTM A 615/A 615M, deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, PP; wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches (1500 mm).
10. Adjusting Rings: Interlocking HDPE rings, with level or sloped edge in thickness and diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser, with 4-inch- (100-mm-) minimum-width flange and 26-inch- (660-mm-) diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER."
2. Material: ASTM A 48/A 48M, Class 35 gray iron unless otherwise indicated.

2.6 CONCRETE

A. See Division 03 Section "Cast in Place Concrete – Site Structural" and Construction Documents.

B. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi (27.6 MPa) minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

a. Invert Slope: 1 percent through manhole.

2. Benches: Concrete, sloped to drain into channel.

a. Slope: 4 percent.

C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING INSTALLATION

A. Comply with Division 22 Section "Common Work Results for Plumbing."

B. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

C. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

D. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

E. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

F. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

G. Install gravity-flow, nonpressure, drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope of 1 percent unless otherwise indicated.
2. Install piping NPS 6 (DN 150) and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
3. Install piping with 36-inch (915-mm) minimum cover.
4. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
5. Install hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
6. Install PVC corrugated sewer piping according to ASTM D 2321 and ASTM F 1668.
7. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.
8. Install nonreinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
9. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

H. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105:

1. Hub-and-spigot, cast-iron soil pipe.
2. Hubless cast-iron soil pipe and fittings.
3. Expansion joints.

I. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure, drainage piping according to the following:

1. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
2. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
3. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
4. Join PVC corrugated sewer piping according to ASTM D 2321.
5. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
6. Join nonreinforced-concrete sewer piping according to ASTM C 14 (ASTM C 14M) and ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
7. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
8. Join dissimilar pipe materials with nonpressure-type, flexible couplings.

3.4 MANHOLE INSTALLATION

A. General: Install manholes complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections with sealants according to ASTM C 891.

C. Install FRP manholes according to manufacturer's written instructions.

D. Form continuous concrete channels and benches between inlets and outlet.

E. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 2 inches (51 mm) above finished surface elsewhere unless otherwise indicated.

F. Install manhole-cover inserts in frame and immediately below cover.

3.5 CONCRETE PLACEMENT

A. See Division 03 Section "Cast in Place Concrete – Site Structural."

3.6 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use Medium-Duty, top-loading classification cleanouts in paved or unpaved foot-traffic areas.
2. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
3. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.

B. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.7 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Division 22 Section "Sanitary Waste and Vent Piping."

B. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch (150-mm) overlap with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).
2. Make branch connections from side into existing piping, NPS 21 (DN 525) or larger or as shown on plans, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches (76 mm) of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches (150 mm) of concrete for minimum length of

12 inches (300 mm) to provide additional support of collar from connection to undisturbed ground.

a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi (20.7 MPa) unless otherwise indicated.
b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

3. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

C. Connect to grease interceptors specified in Division 22 Section "Sanitary Waste Interceptors."

3.8 IDENTIFICATION

A. Materials and their installation are specified Division 33 Section "Common Work Results for Utilities." Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.

1. Use detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.9 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (600 mm) of backfill is in place, and again at completion of Project.

1. Submit separate report for each system inspection.
2. Defects requiring correction include the following:

a. Alignment: Less than full diameter of inside of pipe is visible between structures.
b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
d. Infiltration: Water leakage into piping.
e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.

4. Submit separate report for each test.
5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:

    a. Fill sewer piping with water. Test with pressure of at least 10-foot (3-m) head of water, and maintain such pressure without leakage for at least 15 minutes.
    b. Close openings in system and fill with water.
    c. Purge air and refill with water.
    d. Disconnect water supply.
    e. Test and inspect joints for leaks.

6. Manholes: Perform hydraulic test according to ASTM C 969 (ASTM C 969M).

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.10 CLEANING

A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION 221313

SECTION 222300

PACKAGED BOOSTER PUMPING SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. All work specified in this Section is governed by the Mechanical General Section 230100.

B. This Section 222300 and the accompanying drawings cover the provisions of all labor, equipment, appliances, and materials and performing all operations in connection with the construction and installation of the packaged booster pumping system as specified herein and as shown. The system shall include, but is not limited to, the following; all factory-assembled as one complete assembly:
1. Duplex, variable speed end suction pumps
2. Control panel
3. Bladder surge tank
4. Piping, valves, wiring, etc.
5. Frame

1.2 BASIS OF DESIGN

A. The basis of design is Synchro-Flo. Any proposed substitutions shall be proven equal in all respects to the equipment specified as the basis of design. Any modifications to piping, electrical work, controls, building structure, etc., that result from any substitution shall be coordinated with all trades. This coordination shall occur before delivery of equipment and any modifications shall be performed without incurring additions to the Contract.

1.3 ACCEPTABLE MANUFACTURERS

A. Acceptable substitute manufacturers are Tiger Flow, Bell and Gossett, and Peerless, provided that their pumps, accessories, performance, appearance and physical characteristics are equal in all respects to the basis of design for this specific project.

PART 2 - PRODUCTS

2.1 PUMPS

A. Provide duplex, variable speed pumps with capacities as shown. Pumps shall be close coupled, vertical, multi-stage and capable of being serviced without disturbing piping connections.

B. Pump casing shall be stainless steel. The impeller shall be of cast bronze, enclosed type, dynamically balanced and keyed to the shaft.

C. The liquid cavity shall be sealed off at the motor shaft by an internally-flushed mechanical seal. A bronze shaft sleeve shall completely cover the wetted area under the seal.

D. Pumps shall be rated for a minimum of 175 psi working pressure. Each pump case shall have gauge tappings at the suction and discharge nozzles and shall include vent ports.

E. Motor shall have heavy-duty grease lubricated ball bearings, selected for the maximum load for which the pump is designed. Motor shall be high efficiency.

2.2 CONTROL PANEL

A. Control panel shall be a NEMA I enclosure complete with HOA switches, run lights, control transformer, variable frequency drives with overload protection, disconnect switch, system pressure switch, low suction pressure shut off, minimum run timers for each pump, manual and automatic lead-lag alternator and lag pump start timer. Controller shall feature a color touchscreen.

2.3 TANK

A. Tank shall be an ASME 125 psi stamped bladder type tank with interconnecting piping, ASME relief valve, air charging valve, drain valve and pressure gauge. Tank shall have a minimum capacity as indicated and be the vertical type.

2.4 PIPING AND VALVES

A. Piping shall be stainless steel complete with shut-off valves at each pump suction and discharge. A pressure gauge shall be mounted at the suction header and discharge header.

B. Non-slam, spring loaded, silent check valves shall be provided at each pump discharge.

2.5 FRAME

A. Frame shall be constructed of welded structural steel suitable for grouting to a concrete pad.

2.6 TESTING AND PACKAGING

A. Each system shall be factory tested, thoroughly cleaned and painted with at least one coat of high-grade machinery enamel prior to shipment.

B. The entire system shall be factory assembled and shipped with all interconnecting piping and wiring complete and tested for proper operation. The only field connections required shall be:
1. Suction piping connection
2. Discharge piping connection
3. Drain pipe
4. One power connection at control panel

C. The booster system shall ship with four (4) certified copies of the shop test documenting the operation and capacity of the system as tested at the factory.

D. The packaged booster system shall be NSF/ANSI 61 certified.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The booster system shall be installed in strict accordance with the manufacturer's

recommendations and the Contract Documents.

B. The frame shall be grouted level and secured to the structure with anchor bolts.

C. The booster pump expansion tank shall be located at the system high point in the rooftop storage room.

END OF SECTION 222300

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SECTION 224000

PLUMBING SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. All work specified in this Section is governed by the Mechanical General Section 230100.

B. This Section 224000 and the accompanying drawings cover the provision of all labor, equipment, appliances, and materials and performing all operations in connection with the construction of the plumbing systems as specified herein and as shown. These systems include, but are not limited to, the following:
1. Sanitary waste and vent systems.
2. Domestic water systems.
3. Storm drainage systems.
4. Natural gas systems

C. Provide all final plumbing connections to all equipment furnished by Owner.

D. Provide gate valve and reduced pressure backflow preventer or vacuum breaker at the service entrance and at those connections (especially to kitchen equipment) required by local plumbing code.

1.2 INTENT

A. It is the intent of this Section of the specifications to provide complete and operable plumbing systems as shown and specified which are free of leaks, properly vented, free of unreasonable noise, vibration and sweating, and fabricated so as to fit the space allotted and to exhibit a minimum resistance to fluid flow.

B. The word "piping" is defined to mean all piping, fittings, joints, hangers, coatings, valves, cocks, insulation and accessories necessary for the plumbing systems described, shown and specified.

1.3 SOVENT SYSTEM REQUIREMENTS

A. The sanitary system shall be a conventional waste vent system. The engineer and architect shall be notified if a sovent system is proposed for use on this project.

1.4 GENERAL REQUIREMENTS

A. Provide all reducing fittings, flanges, couplings and unions of the size and type of material to match the piping connections at each fixture, piece of equipment, valve and accessory.

B. Union joints, couplings or flanges shall be provided in each pipe line connected to each piece of equipment, fixture and elsewhere as indicated and specified. Unions shall match the piping system in which they are installed.
1. Unions or flanges shall be provided between all copper to steel connections. These unions shall be dielectric, insulating type.

C. All changes in direction and branches shall be made with manufactured fittings.

D. The use of offset-type reducers is strictly prohibited in any piping system.

E. In all water piping systems, changes in horizontal pipe line sizes shall be made with eccentric reducers installed flat on top for proper air venting. Reducing tees, reducing elbows and concentric reducers shall only be allowed in water piping systems for changing pipe sizes in vertical risers and for making connections to equipment and accessories from vertical risers.

F. All pipe joints shall be cut square and all burrs shall be removed.

G. Open ends of pipe lines not currently being handled shall be plugged during installation to keep dirt, water and foreign material out of the system.

H. Sanitary waste and storm drainage piping shall slope down in the direction of flow as shown on the drawings or as prescribed by Code, but not less than 1 percent.

I. All vents through roof (VTR'S) shall be offset just below the roof such that their termination points are at least 10 ft. from any outside air intake of any HVAC unit; special attention is called to packaged rooftop units.

J. All vents through roof (VTR'S) shall be offset just below the roof such that their termination points are not visible.

K. Trap primers shall be provided at all floor drains and hub drains. Trap primers shall be by Proset or approved alternate.

L. Special attention is called to section 715 of the International Plumbing Code. Backwater valves shall be provided for all fixtures with flood level rim below the next upstream site manhole cover elevation to prevent back flow in the event of surcharge. Backwater valves shall be provided in compliance with this code requirement.

1.5 IDENTIFICATION OF PIPING

A. All aboveground plumbing systems piping and valves sized 3/4" and larger which are installed in accessible locations (including piping above removable ceilings and behind access panels) shall be identified in strict conformance with the "Scheme for the Identification of Piping Systems" (ANSI A13.1 - 1981).

B. Each identification marker shall include the following:
1. Proper color-coded background.
2. Proper color of legend in relation to background color.
3. Proper legend letter size.
4. Proper marker length.
5. Direction of flow arrow shall be included on each marker.

C. Locations for pipe markers shall be as follows:
1. Adjacent to each valve and fitting.
2. At each branch and riser take off.
3. At each pipe passage through walls, floors and ceilings.
4. On all straight pipe runs every 25 feet.

D. Identification markers may be stenciled or shall be Setmark Pipe Markers, as manufactured by Seton Name Plate Corporation.

E. All valves shall be identified with the appropriate service designation and valve number brass valve tags. Each valve tag shall be 19 gauge brass with 1/4" black-filled letters over 1/2" black-filled numbers. Tags shall be fastened to valves with brass "S" hooks or brass jack chain. Brass tags and fasteners shall be as manufactured by Seton Name Plate Corporation

F. Provide charts of all valves. Valve charts shall include the following items:
1. Valve Identification Number
2. Location
3. Purpose/Material

PART 2 - PRODUCTS

2.1 SANITARY WASTE AND VENT SYSTEMS

A. All underground sanitary waste and vent piping shall be PVC, DWV Schedule 40 with socket-type, solvent welded joints in sizes up to 12"; all 15" piping shall be cast iron soil pipe with lead and oakum or neoprene double-seal compression gaskets.

B. Underground sanitary and waste piping directly receiving high temperature waste (such as kitchen, laundry and boiler room areas), shall be hubless cast iron soil pipe.

C. Cleanouts shall be provided at the locations indicated and, as a minimum, where required by Code. Floor cleanouts shall be a minimum of 4" and shall be complete with a flush plug and removable, scoriated bronze floor plate. Provide carpet buttons in carpeted areas.

D. All above ground sanitary, waste and vent piping shall be hubless cast iron soil pipe.

E. Joints on hubless cast iron soil pipe shall be made with neoprene couplings and stainless steel clamps.

F. Floor drains in public toilets and finished areas shall be J. R. Smith 2000 Series with 6" Type B square adjustable strainers finished in satin nickel bronze; or equal products by Josam or Zurn. Provide vandalproof secured tops. All floor drains shall be provided with a trap primer.

G. Floor drains in mechanical rooms and unfinished concrete floors shall be J. R. Smith 2131 Series with round 11 3/4" cast iron grate, sediment bucket and deep-seal P-trap; or equal products by Josam or Zurn. Provide vandalproof secured tops. All floor drains shall be provided with a trap primer.

H. Type "K" floor drains in kitchens and food service areas shall be J.R. Smith 2000 Series with sediment bucket and 8" type "B" square adjustable stainer finished in nickel bronze; or equal products by Josam or Zurn. Provide vandalproof secured tops. All floor drains shall be provided with a trap primer.

I. Type "R" floor drains in kitchens and food service areas shall be J. R. Smith 2000 Series with sediment bucket and 7" type F37 round extended rim strainer finished in nickel bronze; or equal products by Josam or Zurn. Provide vandalproof secured tops. All floor drains shall be provided with a trap primer.

J. Floorsinks (FS) in kitchens and food service areas shall be J. R. Smith 3007-NB Series with 6" deep bodies, removable stainless steel sediment bucket, 12 1/2" square nickel

bronze top and non-puncturing flashing clamps or equal products by Josam or Zurn. Grate configuration shall be coordinated with Kitchen Equipment Consultant to insure proper opening for equipment served; otherwise provide a full grate with openings cut out for equipment served.

2.2 STORM PIPING SYSTEMS

A. Storm piping systems shall be of the same materials specified above in 2.01 for the sanitary, waste and vent system, except that all storm piping shall be hubless cast iron.

B. Wall cleanouts shall be threaded cleanout tees and plugs with polished stainless steel coverplate with centerset screw.

C. The roof drains shall be selected for the insulated roof decks indicated. The roof drain bodies and receivers shall be of cast iron construction; domes shall be cast iron or aluminum and the roof drains shall be complete with flashing clamps having integral gravel stops, deck clamps, gaskets and trim. Roof drains shall be J. R. Smith 1010 or 1015 Series or approved equal products as manufactured by Josam, Zurn.

D. Area drains (AD) shall be J. R. Smith Series 1400 Promenade deck drains with square top, seepage holes, clamps and extensions selected for the roof/deck construction assembly.

E. Emergency overflow drains shall be similar to the roof drains except they shall be water dam type. J.R. Smith 1080 or approved equal.

F. Emergency overflow piping termination shall be J.R. Smith SQ-9-2333. Finish shall be brass.

2.3 DOMESTIC WATER SYSTEM

A. Underground domestic water service entrance piping 3" and smaller in size shall be Type K hard drawn copper tubing with wrought copper fittings. All joints shall be brazed.

B. All underground copper branch lines (1/2" and 3/4" only) shall be continuous lengths of soft Type K copper tubing with no joints allowed underground.

C. Underground domestic water service entrance piping above 3" in size shall be Class 150 ductile iron pipe with mechanical joints.

D. Aboveground domestic water system piping 3" in size and smaller shall be Type L hard drawn copper tubing with wrought copper fittings and soldered joints.

E. Aboveground domestic water piping 4” and larger shall by Type L hard drawn copper tubing with rolled grooved joints and fittings.

F. Gate valves 3" or less in size shall be constructed with a bronze body, non-rising stem. Stem to be bronze ASTM B-62 or silicon bronze ASTM B-371 with malleable iron handwheels. Valve shall meet MSS-SP80. Valve shall be manufactured by Milwaukee, Hammond, Nibco or Stockham.

G. Ball valves 2 inch and smaller:

1. Ball valves shall be two piece bronze body, large port with solid, smooth bore chrome plated brass ball, meeting MSS-SP110. Seats shall be reinforced TFE with Teflon packing ring and threaded adjustable packing nut. Valves on insulated lines will be provided with stem extensions to provide clearance for two inches of pipe insulation. Valves to be Apollo 70, Hammond 8501 or Watts B-6000.

H. Non-freeze wall hydrants (NFWH) shall be non-freeze, bronze box type with vacuum breaker, loose key and wall clamp. Finish shall be rough bronze. Wall hydrants shall be Smith 5509QTPB or approved equal by Josam or Zurn.

I. Backflow preventers shall be Watts Series 909 reduced pressure principle backflow preventers complete with strainer and shut-off valves. Air gap drain shall be piped into nearest floor drain or outside of building to a concrete splashblock.

J. Water pressure reducing valves (PRV) shall be the self-contained direct operating type with bronze body, stainless steel seat, stainless steel spring, and sealed spring cage. The strainer shall have bronze body with 20 mesh stainless steel screen. Strainer shall be attached with a bronze nipple. The unit shall be constructed in accordance with ASSE Standard 1003 and shall bear the seal of approval. The capacities shall be based on maximum reduced pressure fall-off, as defined in the ASSE Standard, of 10 pounds. Pressure regulators shall be Watts Regulator Company's Series 223S or approved equal.

K. Mixing valves shall be Leonard Model No. TM-186 Series, High-Low Thermostatic Mixing Valve Assembly or an approved equal with the 1/2" bypass piped into the smaller TM025 valve. Mixing valve shall be sized by the manufacturer for the fixtures served. Secure the assembly to the adjacent wall.

L. All water hammer arresters (WHA) shall be PDI Certified, Size A, B, C, D, E or F, as indicated for the fixture units served; Josam, Jay R. Smith or Zurn.

M. The hose bibbs (HB) shall be complete with vacuum breaker and handle.

N. Soldered joints shall be made with tin-antimony/silver solder. Solder containing lead shall not be permitted.

2.4 NATURAL GAS PIPING

A. Natural gas piping shall be Schedule 40 black steel complying with ANSI B36.10. Fittings shall be steel or malleable iron. Joints shall be threaded or welded.

B. Gas cocks shall meet ANSI B16.33.

2.5 PLUMBING INSULATION

A. All pipe insulation products shall have a permanent composite insulation, jacket and adhesive fire and smoke hazard rating as tested by procedure ASTM-84, NFPA 255 and UL 723 not exceeding Flame Spread 25 or Smoke Developed 50.

B. Blanket-type insulation shall have an average thermal conductivity not to exceed 0.27 BTU-in. per sq. ft. per degrees F. per hour at a mean temperature of 75 degrees F. Insulation shall have a minimum density of 1 lb./cu.ft. and shall be 2" thick.

C. Preformed insulation for all domestic hot and cold water piping shall be minimum 1" thick preformed fiberglass pipe insulation with white all-service jacket. All longitudinal joints shall be lapped, self-sticking type with all butt joints, tears, etc. sealed with a matching white vapor barrier tape. Elbows shall be mitered or may be Zeston covers filled with equivalent fiberglass insulation. The maximum K value of the insulation shall be 0.23 at 70 degrees F.

2.6 PIPE HANGERS AND SUPPORTS

A. Pipe hangers, hanger rods, trapeze type hangers, upper attachments and other supports shall be selected based on pipe size (plus insulation of pipes specified to be insulated) and the weight of the medium being transported or the medium used for testing, whichever is greater. Provide all hangers and rods, turnbuckles, angles, channels, and other structural supports to support the piping systems. Rods for pipe hangers shall be full size of the hanger manufacturer's catalog listed rod size for each type hanger specified. Hangers and supports shall be Michigan, ITT Grinnell or B-Line.

B. All material utilized for the hanging and support of the piping systems shall be manufactured products which are specifically intended for the purpose of hanging piping systems. The use of wire, steel straps, plastic ties, etc. is strictly prohibited.

C. Pipe hangers selected for supporting horizontal insulated piping shall be sized to fit around the outside of the pipe insulation. Insulated piping shall be supported on galvanized shields.
   1. Shields shall be as follows:
      a. Pipes 2" and smaller: 18 gauge x 12" long.
      b. Pipes 2 1/2" and larger: 16 gauge x 18" long.
   2. Shields shall be 180 degrees around the lower half of the pipe at all pipe hangers, except that on trapeze hangers, pipe racks and floor supported horizontal pipes, shields shall be 360 degrees around the entire pipe.

D. Pipe hangers for copper piping shall be copper plated or the piping shall be dielectrically isolated from any steel hangers or clamps that are used.

E. Steel rods, framing and clamps shall be plated or primed to prevent rust formation.

F. All piping on the service level shall be provided with vibration isolators on hangers and supports.

PART 3 - EXECUTION

3.1 ARRANGEMENT

A. Follow the general piping layout, arrangement, schematics and details. Provide all offsets, vents, drains and connections necessary to accomplish the installation. Fabricate piping accurately to measurements established at the project site to avoid interference with ductwork, other piping, equipment, openings, electrical conduits and light fixtures. Make suitable provision for expansion and contraction with expansion loops and offsets.

B. Water hammer arresters shall be installed at the top of each riser and on each fixture branch in accordance with Plumbing and Drainage Institute Standard WH201.

C. Cleanouts shall be provided at the base of all sanitary and storm risers.

3.2 UNDERGROUND WATER PIPING

A. All underground domestic water piping shall have a minimum cover of 3'-0".

B. Provide concrete thrust blocks at all changes of direction and secure all mechanical joints with restraining rods.

C. All underground copper water lines shall be protected from corrosion with a continuous plastic sheathing or coating and wrapping. This sheathing or coating and wrapping shall be extended 6" to 12" above finished floor.

3.3 MINIMUM HANGER SPACING

A. Pipe hangers or supports shall be provided within 18" of each horizontal fitting, equipment connection, valve, etc. and at not more than 10 ft. spacings along horizontal runs of straight, plain piping.

B. Riser clamps shall be provided at each floor penetration.

3.4 FIRESTOPPING PVC PIPING

A. PVC storm, soil, waste and vent stacks penetrating fire-rated floors and walls shall be flamestopped, firestopped, and waterproofed using ProSet Systems, Inc. Series 45 "Firestop" couplings and Series 90 "Code Red" firestop devices. All other PVC drain, waste, and vent piping penetrating fire-rated floors shall be firestopped and waterproofed using ProSet Systems Series 48 closet stubs, tub boxes, floor drains, shower drains, and "E-Z Flex" flexible couplings. All shall be installed in accordance with the manufacturer's instructions.

B. ProSet "Firestop" couplings used in the DWV system shall be of type I PVC conforming to ASTM D2665 standard. ProSet "Code Red" stack fittings shall be of gray cast iron conforming to ASTM A-48 standard. ProSet "E-Z Flex" connector couplings shall be of flexible PVC conforming to ASTM C594 and ASTM F477 performance standards. Band used for compression joint on the "E-Z Flex" coupling shall be #300 stainless steel. IPS P-70 Primer and Weld-on 795 cement or equal shall be used for all solvent welds in the system.

3.5 INSULATION INSTALLATION

A. Provide blanket insulation over all horizontal roof drain piping which is within the building and including the vertical risers to the roof drains and the underbody of the roof drains.
   1. Blanket insulation shall be wrapped around the piping and underbodies of roof drains. Ends of insulation shall overlap at least 2" and bottom of insulation shall overlap pipe insulation at pipe connection to roof drain at least 3". Adhere insulation to roof drain underbodies with 100% coverage of fire retardant adhesive and tape all joints with 3" wide foil reinforced kraft tape.

B. Provide insulation over all above ground hot and cold water piping, except that no insulation is required on cold water lines installed inside interior plumbing chases (those chases with no exterior wall).
   1. All joints and tears shall be sealed with matching white vapor barrier tape.

3.6 DISINFECTION

A. All domestic water piping installed under this Division shall be disinfected with chlorine before it is placed into operation. The chlorinating material shall be liquid chlorine conforming to Federal Specification BB-C-120 and shall be introduced to the system by experienced operators only. The chlorine solution applied to the piping sections or system shall contain at least fifty parts per million of available chlorine and shall remain in the sections or system for a period of not less than sixteen (16) hours. During the disinfection period, all valves shall be opened and closed at least four times. After the disinfection period, the chlorinated water shall be flushed from the system with clear water until the residual chlorine content is not greater than two-tenths parts per million (0.2 PPM). Submit certification to the Architect that the system was disinfected.

END OF SECTION 224000

SECTION 224240

WATER HEATERS AND ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. All work specified in this Section is governed by the Mechanical General Section 230100.

B. This Section 224240 and the accompanying drawings cover the provisions of all labor, equipment, appliances, and materials and performing all operations in connection with the construction of the water heating systems as specified herein and as shown. These systems include, but are not limited to, the following:
1. Hot water boilers
2. Hot water storage tanks
3. Hot water circulators
4. Controls

1.2 BASIS OF DESIGN

A. The basis of design is Lochinvar. Any proposed substitutions shall be proven equal in all respects to the equipment specified as the basis of design. Any modifications to piping, electrical work, controls, building structure, etc., that result from any substitution shall be coordinated with all trades. This coordination shall occur before delivery of equipment and any modifications shall be performed without incurring additions to the Contract.

PART 2 - PRODUCTS

2.1 CENTRAL SYSTEM HOT WATER BOILER

A. The boiler shall be AGA design certified for a minimum efficiency of 87%.

B. The boilers shall be equipped with ASME pressure relief valve(s) and shall be ASME rated for 160 psi working pressure and shall bear the ASME “H” stamp.

C. The boiler shall be constructed with an 18 gauge pre-painted steel jacket assembly. The interior of the combustion chamber and flue collector shall be stainless steel. All inner jacket panels shall be fully gasketed and sealed. The jacket assembly shall be primed and pre-painted on both sides. All models shall be certified for installation on combustible floors without additional safety provisions. The boiler shall be suitable for installation with zero clearance from combustible material on the left and right side.

D. Each boiler's water tube heat exchanger shall be of a horizontal grid design constructed with copper fin tubes and extra heavy galvanized steel "V" baffles secured tightly to the tubes above the point of tangency of the fins. Each end of the tubes shall be rolled into an ASME fire box steel tube sheet and sealed to cast iron headers. There shall be no “O” rings, bolts or gaskets. Removable access plugs shall be provided on the headers for inspection, cleaning and repair. The heat exchanger shall be capable of withstanding 1200 PSI hydrostatic pressure.

E. Heat exchanger shall be explosion proof on the waterside. It shall have 100% copper and bronze waterways to positively protect the boiler from galvanic action.

F. The burner to be raised port and die formed from stainless steel alloy mounted in an easily removable burner drawer, capable of quiet ignition and extinction, and equipped with fixed primary air ports.

G. The combustion chamber shall be constructed of stainless steel and sealed for combustion. The burner surface shall be constructed of heavy-duty ceramic material and fire in a vertical plane within the combustion chamber. The burner shall be provided with perforated flame injection tube extending the entire length of the heat exchanger. The burner shall fire in a full 360-degree pattern resulting in uniform heat transfer upon every inch of heating surface. A viewing port shall be provided, permitting visual observation of burner operation.

H. The gas train shall be equipped with gas modulation from 20% to 100% with a mechanical primary high limit shut-off feature. Modulating valves may be operated simultaneously or set for stage firing to affect a greater modulation range. The burner shall be Lochinvar M9 Firing Controls must be capable of firing at a complete blue flame with maximum gas and air input, as well as firing infrared when gas and air are reduced and shall be capable of firing from 20 percent up to 100 percent of rated input when supplied with 4 inches water column of inlet gas pressure for a turndown ratio of 5:1.

I. The boiler shall be factory equipped with an automatic reset secondary electric high limit with a fixed setting. The main electric gas valve and all controls shall be 24 volt with a 110/24 volt transformer.

J. The gas train shall include a pre-mix gas valve to supply gas and combustion air in exact proportions to allow burner input to vary based on load. The pre-mix gas valve shall perform the functions of safety shutoff, constant pressure regulation and air/gas ratio control. Full closing of the valve seat shall occur in less than 0.8 seconds when the valve is de-energized. The gas train shall be IRI approved.

K. The boiler shall be provided with a combustion air blower, utilizing pulse width modulation, to draw a precise mixture of fuel and air into the combustion chamber for maximum efficiency. The combustion air blower shall operate for a pre-purge period before burner ignition and a post-purge period after burner operation to clear the combustion chamber. The boiler shall be equipped with a replaceable combustion air filter to protect the blower and burner from contaminants and debris.

L. The shall include an air pressure switch to prove combustion air flow, a flow switch to prove water flow, temperature-pressure gauge, downstream test valve and a factory installed ASME pressure relief valve. Standard controls shall include manual reset high limit, pump control for dedicated boiler pump, system pump and DHW prioritization pump (where applied). Standard construction shall include terminal strips for supply voltage connection, pump control connection, contacts for any failure, contacts for air louvers and run time contacts. The manufacturer shall verify proper operation of the burners, all controls and the heat exchanger by connection to gas, water and venting for a full factory fire test.

M. The boiler shall be provided with a factory mounted microprocessor controls and shall be capable of being tied in to the building energy management system. The electronic integrated control module shall provide on/off control of the gas supply to the burner, operation of the combustion air blower, ignition of the gas-air mixture, flame proving, control of water temperature set points, and monitoring of all safety functions. Controls shall operate multiple boilers in proper sequence and modulation to maintain system

demand.

N. Boiler venting Horizontal Direct Vent Sealed Combustion Flue (flue and air inlet pipe that must terminate in the same pressure zones on the building exterior) with a separate combustion air pipe (M – Prefix Controls Only) using a sidewall vent and air inlet kit supplied by Lochinvar. Boiler flue and intake shall be field installed per manufacturer's recommendations.

O. The boiler shall be certified and listed by C.S.A. International under the latest edition of the harmonized ANSI Z21.13 test standard and shall comply with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 Standard or local code whichever is stricter.

P. The boiler shall be Lochinvar Power-Fin, capacity, quantity and accessories as shown on the drawings. Installation shall be in compliance with manufacturers recommendations. See details on the drawings for piping requirements.

2.2 CENTRAL SYSTEM STORAGE TANK

A. The central system storage tanks shall be Lochinvar Lock-Temp jacketed tank.

B. The storage tanks shall be cement lined and shall be rated for 150 psi working pressure. Provide with temperature gauge pressure gauge, handhole, and manway.

C. The storage tank shall be ASME rated and shall include a safety drain pan system.

2.3 HOT WATER CIRCULATOR

A. Hot water circulator shall be Bell & Gossett Series PR. Install as detailed and coordinate with Division 26 for necessary power.

2.4 HOT WATER EXPANSION TANK

A. Hot water expansion tank shall be provided with capacity shown on plans. Tank shall be rated for 200°F. (minimum) and 150 psi (minimum) working pressure. Tank shall be factory pre-charged and shall be provided with polypropylene diaphragm.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The water heaters and accessories shall be installed in strict accordance with the manufacturer's recommendations and the Contract Documents.

B. All temperature and pressure relief valves shall be piped full size to an indirect waste such as the nearest floor drain, service sink, sink tailpiece, etc.

C. Boilers and storage tank shall be installed on equipment pads.

D. Provide manual and automatic boiler shut down controls as required by code.

E. Installation of the boiler system shall include multiple boilers, storage tanks, pumps and piping as detailed and schedules. Provide all controls, accessories, etc for a complete

system.

F. Boilers shall be tied in to the EMS system for control and monitoring.

END OF SECTION 224240

SECTION 224500

PLUMBING FIXTURES AND TRIM

PART 1 – GENERAL

1.1 DESCRIPTION

A. All work specified in this section is governed by the Mechanical General Section 230100.

B. This Section 224500 and the accompanying drawings cover the provisions of all labor, fixtures, equipment, appliances and materials, and performing all operations in connection with the construction and installation of the plumbing fixtures and trim as specified herein and as shown.

C. All exposed piping, valves, stops, P-traps, etc. shall be chrome-plated. Also, all exposed piping penetrations through walls, floors or ceilings shall be provided with chrome-plated cast brass escutcheons.

D. All P-traps shall be minimum 17-gauge brass.

E. Flush valves shall have non-hold open feature, vacuum breakers and cover cap on angle-type stop.

F. Provide all final connections to all equipment and fixtures furnished by Owner.

G. Unless otherwise specified in an individual fixture description, all enameled cast-iron and porcelain fixtures shall be white.

1.2 INTENT

A. It is the intent of this Section of the specifications to provide complete, operable, adjusted, clean plumbing fixtures as shown and specified, which are free of leaks, noise, air, vibration and waterflow fluctuations.

1.3 BASIS OF DESIGN

A. The basis of design is as outlined for each fixture in the PART 2 - PRODUCTS subsection. Any proposed substitutions shall be proven equal in all respects to the equipment specified as the basis of design.

1.4 ACCEPTABLE MANUFACTURERS

A. Acceptable fixture manufacturers under this specification are American Standard, Toto, Eljer and Kohler provided that their units are equal in all respects for this specific project. Faucets and trim may be equal products as manufactured by Chicago, Toto, Delany, T&S Bronze and Brass Works or Speakman. Stainless steel sinks and drinking fountains shall be as manufactured by those companies specified for each specific item outlined under subsection 2.4 and 2.5.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES

A. Refer to the plumbing drawings for all back-of-house plumbing fixtures under this specification. For all other plumbing fixtures located in kitchens, guestrooms, common area restrooms, etc., please refer to the respective consultant drawings (Interior, Food Service, etc.).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Units shall be installed as indicated and in conformance with the manufacturer's recommendations. Coordinate the actual units to be provided with all trades.

B. All plumbing fixtures shall be free of leaks, provided completely finished, trimmed, adjusted, cleaned and ready for use. They shall be properly secured to the structure by the use of thru-bolting, backplates, carriers, expansion shields (for floor mounting only) or toggle bolts.

C. Wall hung fixtures supported on chair carriers shall be bolted to the floor slab. Carefully coordinate space requirements and fixture mounting height requirements with supports being furnished.

D. Fixtures supported with wall hangers on masonry chase walls shall be fastened to the wall with not less than 3/8" bolts which shall pass through the wall and through a 1/4" x 4" wide steel backplate on the unfinished chase wall side.

E. Where fixtures are hung on single masonry walls without a pipe chase behind, they shall be mounted with 3/8" toggle bolts.

F. Fixtures on steel stud walls shall have a 1/4" x 4" wide steel backplate wired with 1/16" steel wire to the studs. Bolts not less than 3/8" shall secure the fixtures through the fixture hanger and the backplate.

G. All mounting holes provided in fixtures shall be used for support. In addition to the main hangers, 1/4" toggle bolts shall secure the bottom of all wall hung fixtures at each drilling provided for this purpose.

H. Mount wall-hung fixtures at the heights indicated on the architectural Drawings or as prescribed by local code. Special attention is called to the installation requirements of the ANSI Handicap Code.

3.2 CLEANING AND ADJUSTMENT

A. The units shall be cleaned, tested and field-adjusted to provide optimum flow and drainage.

END OF SECTION 224500