SECTION 33 10 00

WATER UTILITIES - FOR 6" FIRE LATERAL EXTENSION ONLY

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies materials and procedures for construction of underground water distribution for domestic and/or fire supply systems outside the building that are complete and ready for operation. This includes piping, structures, appurtenances and all other incidentals.

1.2 RELATED WORK

A. Concrete: Section 03 30 00, CAST IN-PLACE CONCRETE.

B. Submittals: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

1.3 DEFINITIONS

A. Water distribution system: Pipelines and appurtenances which are part of the distribution system outside the building for potable water and fire supply.

B. Water service line: Pipeline from main line to 5 feet outside of building.

1.4 ABBREVIATIONS

A. PVC: Polyvinyl chloride plastic.

B. DI: Ductile iron pipe.

C. WOG: Water, Oil and Gas.

1.5 DELIVERY, STORAGE AND HANDLING

A. Ensure that valves are dry and internally protected against rust and corrosion. Protect valves against damage to threaded ends and flange faces.

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

C. Protect stored piping from moisture and dirt by elevating above grade. Protect flanges, fittings, and specialties from moisture and dirt.

D. Store plastic piping protected from direct sunlight and support to prevent sagging and bending.

E. Cleanliness of Piping and Equipment Systems:

1. Care shall be exercised in the storage and handling of equipment and piping material to be incorporated in the work. Debris arising from cutting, threading and welding of piping shall be removed.
2. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.

1.6 COORDINATION

A. Coordinate connection to water main with Public Utility company.

B. Coordinate water service lines with building contractor.

1.7 QUALITY ASSURANCE:

A. Products Criteria:
   1. When two or more units of the same type or class of materials or equipment are required, these units shall be products of one manufacturer.
   2. A nameplate bearing manufacturer's name or trademark, including model number, shall be securely affixed in a conspicuous place on equipment. In addition, the model number shall be either cast integrally with equipment, stamped, or otherwise permanently marked on each item of equipment.

B. Materials and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least three years. Digital electronic devices, software and systems such as controls, instruments or computer work stations shall be the current generation of technology and basic design that has a proven satisfactory service record of at least three years.

C. Regulatory requirements:
   1. Comply with the rules and regulations of the public utility company having jurisdiction over the connection to public water lines and the extension and/or modifications to public utility systems.
   2. Comply with all rules and regulations of Federal, State and Local authorities having jurisdiction for fire-suppression water-service piping including materials, hose threads, installation and testing.

D. Provide certification of factory hydrostatic testing of not less than 500 psi (3.5 MPa) in accordance with AWWA C151. Piping materials shall bear the label, stamp or other markings of the specified testing agency.

E. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material

being installed, printed copies of these recommendations shall be furnished to the Resident Engineer prior to installation.

F. Applicable codes:

1. Plumbing Systems: IPC, International Plumbing Code.
2. Electrical components, devices and accessories shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for intended use.
3. Fire-service main products shall be listed in the FM Global "Approval Guide" or Underwriters Laboratories (UL) "Fire Protection Equipment Directory".

1.8 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American National Standards Institute (ANSI):

MSS SP-60-2004 .....Connecting Flange Joint Between Tapping Sleeves and Tapping Valves

MSS SP-123-1998(R2006)..Non-Ferrous Threaded and Solder-Joint Unions for Use With Copper Water Tube

C. American Society of Mechanical Engineers (ASME):

A112.1.2-2004.....Air Gaps in Plumbing Systems (for Plumbing Fixtures and Water-Connected Receptors))

A112.6.3-2001.....Floor Drains

B16.1-2010.....Gray Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250

B16.18-2001.....Cast Copper Alloy Solder Joint Pressure Fittings

B16.22-2001.....Wrought Copper and Copper Alloy Solder Joint Pressure Fittings

B16.24-2006.....Cast Copper Alloy Pipe Flanges and Flanged Fittings; Classes 150, 300, 600, 900, 1500 and 2500

B31.....Code for Pressure Piping Standards

D. American Society for Testing and Materials (ASTM):

A36/A36M-08.....Carbon Structural Steel

A48/A48M-08(2008).....Gray Iron Castings

A536-84(2009).....Ductile Iron Castings

B61-08.....Steam or Valve Bronze Castings

B62-09.....Composition Bronze or Ounce Metal Castings

B88/B88M-09.....Seamless Copper Water Tube

C651-05.....Disinfecting Water Mains

C858-10e1.....Underground Precast Utility Structures

D1785-06.....Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

D2464-06.....Threaded Poly (Vinyl Chloride) PVC Pipe Fittings, Schedule 80

D2466-06.....Poly (Vinyl Chloride) (PVC) Pipe Fittings, Schedule 40

D2467-06.....Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

F1267-07.....Metal, Expanded, Steel

E. American Water Works Association (AWWA):

B300-10.....Hypochlorites

B301-10.....Liquid Chlorine

C104-08.....Cement-Mortar Lining for Ductile Iron Pipe and Fittings

C110-08.....Ductile Iron and Gray-Iron Fittings

C111/A21.11-07.....Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings

C115/A21.11-11.....Flanged Ductile Iron Pipe with Ductile Iron or Gray-Iron Threaded Flanges

C151/A21.51-09.....Ductile Iron Pipe, Centrifugally Cast

C153/A21.53-11.....Ductile Iron Compact Fittings for Water Service

C502-05.....Dry-Barrel Fire Hydrants

C503-05.....Wet-Barrel Fire Hydrants

C508-09.....Swing-Check Valves for Waterworks Service, 2-In. Through 24-In. (50-mm Through 600-mm) NPS

C509-09.....Resilient-Seated Gate Valves for Water Supply Service

C510-07.....Double Check Valve Backflow Prevention Assembly

C511-07.....Reduced-Pressure Principle Backflow Prevention Assembly

C512-07.....Air Release, Air/Vacuum and Combination Air Valves

C550-05.....Protective Interior Coatings for Valves and Hydrants

C600-10.....Installation of Ductile Iron Mains and Their Appurtenances

C605-11.....Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water

C606-11.....Grooved and Shouldered Joints

C651-05.....Disinfecting Water Mains

C800-05.....Underground Service Line Valves and Fittings

C900-09.....Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution

C907-04.....Injection-Molded PVC Pressure Fittings, 4 Inch through 12 Inch (100 mm through 300 mm), for Water Distribution

M23-2nd Ed.....PVC Pipe, Design and Installation

M44-2nd Ed.....Distribution Valves: Selection, Installation, Field Testing and Maintenance

F. National Fire Protection Association (NFPA):

NFPA 24-2010 Ed.....Installation of Private Fire Service Mains and Their Appurtenances

NFPA 1963-2009 Ed.....Fire Hose Connections

G. NSF International (NSF):

NSF/ANSI 14 (2013).....Plastics Piping System Components and Related Materials

NSF/ANSI 61-2012.....Drinking Water System Components - Health Effects

NSF/ANSI 372-2011.....Drinking Water System Components - Lead Content

H. American Society of Safety Engineers (ASSE):

1003-2009 .....Water Pressure Reducing Valves

1015-2009.....Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies

1020-2004.....Pressure Vacuum Breaker Assembly

1047-2009.....Performance Requirements for Reduced Pressure Detector Fire Protection Backflow Prevention Assemblies

1048-2009.....Performance Requirements for Double Check Detector Fire Protection Backflow Prevention Assemblies

1060-2006.....Performance Requirements for Outdoor Enclosures for Fluid Conveying Components

I. Underwriters' Laboratories (UL):

246.....Hydrants for Fire-Protection Service

262.....Gate Valves for Fire-Protection Service

312.....Check Valves for Fire-Protection Service

405.....Fire Department Connection Devices

753.....Alarm Accessories for Automatic Water-Supply Control Valves for Fire Protection Service

789.....Indicator Posts for Fire-Protection Service

1091.....Butterfly Valves for Fire-Protection Service

1285.....Pipe and Couplings, Polyvinyl Chloride (PVC), and Oriented Polyvinyl Chloride (PVCO) for Underground Fire Service

1.9 WARRANTY

A. The Contractor shall remedy any defect due to faulty material or workmanship and pay for any damage to other work resulting therefrom within a period of two years from final acceptance. Further, the Contractor will furnish all manufacturers' and supplier's written guarantees and warranties covering materials and equipment furnished under this Contract.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Plastic pipe, fittings, and solvent cement shall meet NSF/ANSI 14 and shall be NSF listed for the service intended.

2.2 FACTORY-ASSEMBLED PRODUCTS

A. Standardization of components shall be maximized to reduce spare part requirements. The contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly.

2.3 POLYVINYL CHLORIDE PIPE AND FITTINGS

A. PVC, AWWA Pipe: AWWA C900, Class 200, with bell end with gasket, and with spigot end.

1. Comply with UL 1285 for fire-service mains if indicated.
2. PVC Fabricated Fittings: AWWA C900, Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
4. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
   a. Gaskets: AWWA C111, rubber.

5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
   a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron

2.4 VALVES

A. Gate Valves: AWWA C509, Non-rising Stem, Resilient Seat, 200 psi (1380 kPa).
   1. Valves 3 inches (75 mm) and larger: Resilient seat valve with gray- or ductile iron body and bonnet; cast iron or bronze double-disc gate; bronze gate rings; non-rising bronze stem and stem nut.
   2. Interior and exterior coating: AWWA C550, thermo-setting or fusion epoxy.
   3. Underground valve nut: Furnish valves with 2 inch (50 mm) nut for socket wrench operation.
   4. Aboveground and pit operation: Furnish valves with hand wheels.
   5. End connections shall match main line pipe.

B. Gate Valve Accessories and Specialties
   1. Tapping-Sleeve Assembly: ANSI MSS SP-60; sleeve and valve to be compatible with the drilling matching.
      a. Tapping Sleeve: Cast Iron, Ductile Iron, or Stainless-Steel, two-piece bolted sleeve. Sleeve to match the size and type of pipe material being tapped.
      b. Valve shall include one raised face flange mating tapping-sleeve flange.
   2. Valve Boxes: AWWA M44 with 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.
   3. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut. (Provide two wrenches for Project.)

C. Swing Check Valves:
   1. Valves smaller than 2 inches (25 mm): ASTM B61, resilient seat, bronze body and bonnet, pressure rating of 200 psi (1380 kPa). Ends to match main line piping.
   2. Valves 2 inches (25 mm) or larger: AWWA 508, resilient seat valve with iron body and bonnet, pressure rating of 200 psi (1380 kPa).
   3. Coating: AWWA C550, fusion epoxy coated.

2.5 WARNING TAPE

A. Warning tape shall be standard, 4 mil. Polyethylene, 3 inch (76 mm) wide tape, non-detectable type, blue with black letters and imprinted with "CAUTION BURIED WATER LINE BELOW".

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Use pipe, fittings, and joining methods for piping systems according to the following applications.
   1. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
   2. Do not use flanges or unions for underground piping.
   3. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

B. Underground Fire-Service-Main Piping NPS 4 to NPS 12 (DN 100 to DN 300) shall be the following:
   1. Ductile Iron, push-on-joint pipe; ductile iron, push-on-joint fittings; and gasketed joints.
   2. PVC, AWWA Class 200 pipe listed for fire-protection service; PVC Class 150 fabricated or molded fittings; and gasketed joints.

3.2 VALVE APPLICATIONS

A. 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, non-rising-stem gate valves for installation with indicator posts.

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

3.3 PVC PIPE

A. PVC piping shall be installed in strict accordance with the manufacturer's instructions and AWWA C605. Place selected material and thoroughly compacted to one foot above the top of the pipe.

B. Magnetic markers may be used in lieu of copper tracer wire to aid in future pipe location. Generally, install markers on 20 foot (6 m) centers. If pipe is in a congested piping area, install on 10 foot (3 m)

centers. Prepare as-built drawing indicating exact location of magnetic markers.

3.4 ANCHORAGE INSTALLATION

A. Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include: concrete thrust blocks.

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. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
3. 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.

3.5 VALVE INSTALLATION

A. AWWA Valves: Install each underground valve with stem pointing up and with valve box.

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

C. Relief Valves: Install aboveground with shutoff valve on inlet.

D. Raise or lower existing valve and curb stop boxes and fire hydrants to finish grade in areas being graded.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties. Install water service lines to a point of connection within approximately 5 feet (1500 mm) outside of building(s) to which service is to be connected and make connections thereto. If building services have not been installed provide temporary caps and mark for future connection.

3.7 FIELD QUALITY CONTROL

A. 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. Prior to final acceptance, provide a video record of all piping from the building to the municipal connection to show the lines are free from obstructions, properly sloped and joined.

C. Perform hydrostatic tests at not less than one-and-one-half times working pressure for two hours.

1. Increase pressure in 50-psi (350-kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psi (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.

D. Prepare reports of testing activities.

3.8 IDENTIFICATION

A. Install continuous underground warning tape 12 inches (300 mm) directly over piping.

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