SECTION 211100 – FACILITY FIRE PROTECTION WATER SERVICE PIPING

Latest Edition: 2-14-2019 See Underlined Text for Edits.

(Engineer shall edit specifications and blue text in header to meet project requirements. This includes but is not limited to updating Equipment and/or Material Model Numbers indicated in the specifications and adding any additional specifications that may be required by the project. Also turn off all "Underlines".)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section and all other sections of Division 21.

1.2 SUMMARY

A. This section includes the requirements for facility fire protection service mains and specialties below grade from five (5) feet outside the building to the points of connection to the meter vault and includes the following:

1. Pipes and fittings.
2. Special pipe fittings.
3. Flexible expansion joints.
4. Encasements for piping.
5. Site fire hydrant and curb valve.

1.3 ACTION SUBMITTALS

A. Product Data: For each specified product, include manufacturers cut sheets, dimensional data, performance data, installation instructions and warranty information.

B. Shop Drawings: Comply with the following:

1. Include plans, elevations, sections, details, and attachments to other work for fire protection service piping, valves and fittings, vaults, protective enclosures and post indicator valves.
2. Include construction details, material descriptions, dimensions of individual components and profiles, required clearances, method of field assembly, and location and size of each field connection.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Include a copy of each approved submittal along with any applicable maintenance data in the project operation and maintenance manual.

B. As Built Drawings: See Division 21, Specification Section "Basic Fire Protection Requirements" for requirements.

1.4 COORDINATION

A. Coordinate the installation of the fire protection service main with all other trades that have work close to and/or in the same area of the project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves, including fire hydrants, for transport according to the following:

1. Ensure valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. Use precautions during storage for valves, including fire hydrants, according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Use sling to handle valves and fire hydrants if size required handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. 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.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

1.6 QUALITY ASSURANCE

A. Material and Installation Specifications: City of Baltimore, Department of Public Works (CBDPW), Specifications - Materials, Highways, Bridges, Utilities, and Incidental Structures, 2006, as amended to date. Delete references to “Measurement and Payment”.

B. Standard Details: CBDPW Standard Details, March 2008, as amended to date.

C. Water Service Components and Accessories: All water service components and accessories shall be installed using new materials designed and built in accordance with

the best practices of the industry. Each major item or material shall bear the manufacturer's name and nominal size, if applicable.

D. Installing Contractor: The contractor installing the exterior water mains, shall be licensed and approved by The Baltimore City Department of Public Works (BCDPW) and has been a contractor in good standing with the BCDPW for at least ten (10) years.

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

1.7 PROJECT CONDITIONS

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

1. Notify UMB Design and Construction Department no fewer than ten (10) business days in advance of proposed interruption of utility services.
2. Do not proceed with interruption of existing facility water service without written permission from the UMB Design and Construction Department.

1.8 WARRANTY/GUARANTEE

A. See Division 21, Specification Section "Basic Fire Protection Requirements" for warranty and guarantee requirements.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

A. Material Design and Selection: Facility fire protection water piping, fittings, and specialties shall be designed and selected, for the intended use, and in accordance with the sizes on the drawings and the requirements of the specification.

B. Acceptable Manufacturers:

1. Ductile Iron Fire Protection Service Pipe: All ductile iron pipe and fittings shall be by one (1) of the following manufacturers:

a. American (American Cast Iron Pipe Company).
b. US Pipe Company.
c. Atlantic States Cast Iron Pipe Company.
d. Tyler Pipe Company.

C. PIPE APPLICATION SCHEDULE

Pipe System	Pipe Material	Fitting Material	Joint Method
Fire Protection Water Service Mains Below Grade from five (5) feet beyond the building to the Meter Vault	Ductile Iron: AWWA C151/A21.15 or AWWA C104 cement mortar lining.	Piping 3 inch and larger: Ductile Iron: AWWA C110 or AWWA C153/A21.53 with AWWA C104 cement mortar lining.	Push on or mechanical joints and gaskets. Joints – AWWA C151. Gaskets – AWWA C111/A21.11 rubber.

2.2 SPECIAL PIPE FITTINGS

A. Ductile Iron Flexible Expansion Joints:

1. Description: Compound, ductile iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two (2) gasketed ball joint sections and one or more gasketed sleeve sections. Assemble components for offset and expansion indicated. Include AWWA C111, ductile iron glands, rubber gaskets, and steel bolts.
2. Pressure Rating: 250 psig minimum.

B. Ductile Iron Deflection Fittings:

1. Description: Compound, ductile iron coupling fitting with sleeve and one (1) or two (2) flexing sections for up to 15° deflection, gaskets, and restrained joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile iron glands, rubber gaskets, and steel bolts.
2. Pressure Rating: 250 psig minimum.

2.3 ENCASEMENT FOR PIPING

A. Standard: ASTM A 674 or AWWA C105.

B. Material: [Linear low-density PE film of 0.008-inch minimum thickness] [or] [high-density, cross-laminated PE film of 0.004-inch minimum thickness].

C. Form: [Sheet] [or] [tube].

D. Color: [Black] [or] [natural] <Insert color>.

2.4 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.
2. Standard: AWWA C219.
3. Center Sleeve Material: [Manufacturer's standard] [Carbon steel] [Stainless steel] [Ductile iron] [Malleable iron].
4. Gasket Material: Natural or synthetic rubber.

5. Pressure Rating: [150 psig] [200 psig] minimum.
6. Metal Component Finish: Corrosion resistant coating or material.

2.5 CURB VALVES AND FIRE HYDRANTS

A. Curb Valves: Comply with AWWA C800 for high-pressure, service line valves. Valve has bronze body, ground key plug or ball, wide tee head, and inlet and outlet matching service piping material.

2.6 WATER METERS

A. Water Meters: Water meters are furnished by Division 22, Specification Section "Facility Water, Sewer and Storm Water Service Piping."

2.7 WATER METER VAULTS

A. Water Meter Vaults: Water Meter vaults are furnished by Division 22, Specification Section "Facility Water, Sewer and Storm Water Service Piping."

2.8 SITE FIRE HYDRANTS

A. Site Fire Hydrants: Site fire hydrants shall be furnished by and obtained from the BCDPW, Bureau of Water and Wastewater, Utility Engineering Division.

PART 3 - EXECUTION

3.1 GENERAL

A. Install all fire service main components as required in accordance with the applicable codes and the best practices of the industry.

B. Coordinate clearance requirements with general contractor for piping penetrating walls and floor slabs.

C. Install accessories that do not corrode or soften in either a wet or dry state.

3.2 EARTHWORK

A. Comply with excavating, trenching, and backfilling requirements in Division 31, Specification Section "Earth Moving."

3.3 PIPING INSTALLATION

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

B. Install ductile iron, fire suppression water service piping according to AWWA C600 and AWWA M41 and in accordance with BCDPW Specifications and Standard Details.

C. Bury piping with depth of cover over top at least [thirty (30) inches] <Insert dimension>, with top at least [twelve (12) inches] <Insert dimension> below level of maximum frost penetration, and according to the following.

1. Under Driveways: With at least [thirty six (36) inches] <Insert dimension> of cover over top.

D. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.

E. Extend and connect fire suppression water service piping to the water supply source and to the building fire suppression water service piping systems at locations and pipe sizes indicated.

F. 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.

3.4 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure rating same as or higher than systems pressure rating for aboveground applications unless otherwise indicated.

B. Ream ends of tubes and remove burrs.

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

D. Ductile Iron Piping, Gasketed Joints for Fire Service Main Piping: UL 194.

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

3.5 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.
3. Set screw mechanical retainer glands.
4. Bolted flanged joints.
5. Heat-fused joints.
6. Pipe clamps and tie rods.
7. <Insert devices>.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches in fire suppression water service piping according to NFPA 24 and the following.

1. Gasketed Joint, Ductile Iron, Water Service Piping: According to AWWA C600.
2. Gasketed Joint, PVC Water Service Piping: According to AWWA M23.

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

3.6 INSTALLATION SITE FIRE HYDRANT INSTALLATION

A. Installation: Install site fire hydrants in accordance with the BCDPW Specifications and Details.

B. Gate Valve: Provide each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.

3.7 CONNECTIONS

A. Connect fire suppression water service main to each interior fire suppression water service main five (5) feet from the building and to the connections at each meter vault.

3.8 FIELD QUALITY CONTROL

A. Test Procedure: Use the test procedure prescribed described below, or as required by the UMB Fire Marshal.

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

C. Hydrostatic Tests: Test at not less than one and one half (1-1/2) times the working pressure for four (4) hours.

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

D. Test and Inspection Reports: Submit test and inspection reports in an electronic 'pdf' file format to the UMB Project Manager.

3.9 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground fire suppression water service piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Division 31 Specification Section "Earth Moving."

3.10 CLEANING

A. Clean and disinfect fire suppression water service piping as follows:

1. Purge new piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by the UMB Fire Marshal or use the 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. Use purging and disinfecting procedure prescribed in AWWA C651 as described below, or as required by the UMB Fire Marshal:

    a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow it to stand for twenty four (24) hours.
    b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least two hundred (200) ppm of chlorine; isolate and allow it to stand for three 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 the UMB Fire Marshal. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging [and disinfecting] activities.

END OF SECTION 211100