

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 1 Specification Sections, apply to this Section.
- B. Fire safety during Construction shall comply with the requirements of IBC 2015 NJ Ed. Section 3302.3 and IFC 2015 Chapter 33
- C. Site Wide Materials Management Plan Dated to be prepared by the Selected Bidder

1.2 SUMMARY

- A. This Section includes water-distribution piping and specialties outside the building for the following:
 - 1. Water services.
- B. Contractor furnished products as required by the approving Authority to construct and test a complete working water service system as indicated on the plans.

1.3 SUBMITTALS

- A. Product Data: For the following:
 - 1. Water Piping Installation
 - 2. Piping specialties.
 - 3. Valves and accessories.
 - 4. Water accessories.
- B. Shop Drawings: For the following:
 - 1. Water main piping and accessories.
 - 2. Valves
 - 3. Testing Procedures
- C. Coordination Drawings: For piping and specialties including relation to other services in same area. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
- D. Field Quality-Control Test Reports: From Contractor.
- E. Operation and Maintenance Data: For specialties to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 include the following:
 - 1. Connections
 - 2. Valves.

- F. Record Drawings: At project closeout, submit record as-built drawings of installed water piping in accordance with contact requirements and authority having jurisdiction.

1.4 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size and dimensional requirements of piping and specialties and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- B. 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 disinfecting.
 - 3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- C. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Comply with FM's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
- G. NSF Compliance:
 - 1. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, according to the following:
 - 1. Ensure that 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. During Storage: Use precautions for valves, according to the following:
 - 1. Pipes, valves, hydrants, gaskets, and fittings shall be inspected for damage when received and shall be inspected prior to installation.
 - 2. The torquing of bolted joints shall be checked

3. Pipe, valves, hydrants, and fittings shall be clean inside.
 4. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 5. 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. Handling: Use sling to handle valves and fire hydrants if size requires 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. When work is stopped, the open ends of pipe, valves, hydrants, and fittings shall be plugged to prevent stones and foreign materials from entering.
- F. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- G. Protect flanges, fittings, and specialties from moisture and dirt.
- H. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.
- I. Plain ends shall be inspected for signs of damage prior to installation.
- J. Under no circumstances shall water main materials be dropped or dumped.
- K. Pipe shall not be rolled or skidded against other pipe materials.
- L. Pipes shall bear throughout their full length and shall not be supported by the bell ends only or by blocks.
- M. If the ground is soft or of a quicksand nature, special provisions shall be made for supporting pipe.
- N. Valves and fittings used with nonmetallic pipe shall be supported and restrained in accordance with the manufacturer's specifications.

1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to

provide temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's written permission.

1.7 COORDINATION

- A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified unless required by the Authority having Jurisdiction.

2.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 COPPER TUBE AND FITTINGS

- A. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.

1. Copper Tube: ASME B16.18, cast-copper-alloy or ASME B 16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.

- B. Hard Copper Tube: ASTM B 88, Type K water tube, drawn temper.

1. Copper Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.

2.4 DUCTILE-IRON PIPE AND FITTINGS

- A. Class 52 Ductile Iron Cement Lined (Double thickness) pressure class 200 in conformance of ANSI/AWWA C150/A21.50-02. The push on rubber gasket shall conform to ANSI/AWWA C111/A21.11, the national standard for rubber gasket joints.

- B. All pipe shall have an outside coating in accordance with ANSI/AWWA C110/A21.10. The outside casting shall be a petroleum asphaltic coating. The coating shall be applied to the outside of all fittings. The finished coating shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun, and strongly adherent to the fitting.

- C. Cement Mortar lining shall conform with the latest revision of ANSI/AWWA

- C104/A21.4-95.
- D. All pipe fittings shall be mechanical joint class 350 compact fittings in accordance to ANSI/AWWA C104/21.4 or have an epoxy coating on the interior/exterior surface for ductile iron fittings in accordance to ANSI/AWWA C116/A21.16-98
 - E. Fittings shall have distinctly cast on them pressure ratings, nominal diameters of openings and the number of degrees or fraction of the circle on the bends. Ductile Iron fittings shall have the letters "DI" or "Ductile" cast on them. Cast letters and figures shall be on the outside body of the fitting set forth in the latest revision of ANSI/AWWA C110/A21.10-98
 - F. All jointing materials shall be as furnished by the manufacturer of pipe and fittings and as specified above. All jointing materials shall be in accordance with ANSI/AWWA C111 A21.11-00.

2.5 GATE VALVES

- A. AWWA, Cast-Iron Gate Valves: or as per the approving authority.
 - 1. Gate Valves shall be iron body fully bronze mounted, double disc, parallel seat valves with ends suitable for laying with the class pipe used in the construction of the ductile iron water main. Resilient seat modified wedge valves are acceptable as an alternate to the double disc gate valves.
 - 2. All gate valves shall be Mueller Company of Decatur, IL, or previously approved equal make, and shall meet or exceed all applicable AWWA Standards and meet all requirements, standards and operating functions of NEW JERSEY AMERICAN WATER COMPANY AND CITY OF ELIZABETH ENGINEERING DEPARTMENT.
 - 3. All valves shall be gate type and installed completely with all necessary operating mechanisms, valve boxes and appurtenances necessary for the satisfactory operation of same.
 - 4. All buried valves shall be non-rising stem type with 2" square operating nut and adjustable cast iron valve boxes and covers.
 - 5. All wearing parts shall be renewable of solid bronze or faced with bronze securely fastened to the castings. All valves shall have "O" ring stem seals. Parts of the valves of the same size and make shall be perfectly interchangeable with existing valves of the NEW JERSEY AMERICAN WATER COMPANY system. Resilient seat modified wedge valves shall have machined seating surfaces. The rubber seat on resilient seat gate valves shall be steel reinforced, molded separately from the disc and be field replaceable.
 - 6. All gate valves shall have the manufacturer's name upon them and all iron work shall be thoroughly cleaned and coated at the shop with suitable coating material. All valves shall be tested for leakage and distortion to a pressure of 330 p.s.i. before shipment.

7. All gate valves **shall open by turning left** (counter clockwise) and the direction of opening shall be plainly marked on the operating mechanism.
8. Valve boxes shall be cast iron, in two sections, with the upper section adjustable for elevation and with round drop cover marked "Water". The base shall be centered over the valve and shall rest on compacted backfill. The top of the base section shall be approximately on line with operating nut at the top of the valve stem. Valve boxes shall be coated both inside and outside. The entire assembly shall be constructed straight and plumb to the satisfaction of NEW JERSEY AMERICAN WATER COMPANY AND CITY OF ELIZABETH ENGINEERING DEPARTMENT.

2.6 FIRE HYDRANTS

- A. All Fire hydrants shall be of the Mueller Centurion type, or previously approved equal, shall be of improved AWWA type and shall be equipped with three-way NST hose nozzles, with two – 2-1/2" side connections and one 4" Storz front connection.
 1. All nozzle thread shall conform to the **CITY OF ELIZABETH ENGINEERING DEPARTMENT STANDARD THREAD**.
 2. The connection pipe and valve from the tee in the main line to and including the Fire Hydrant shall be mechanical joint and shall be the same type as specified under the respective items elsewhere in these specifications.
 3. Fire Hydrant main valve shall be five and one-quarter inch (5-1/4") in size or as specified on the detail sheet with a six inch (6") mechanical joint inlet connection.
 4. Fire Hydrants shall have the name of the manufacturer, size and year of manufacture cast upon it in raised letters.
 5. The main valve of the hydrant shall open against pressure. This valve shall be faced with rubber which shall seat against an accurately machined bronze seat. **The direction of opening shall be to the left** and shall be cast upon the hydrant head in raised letters.
 6. All fire hydrants shall be of such height that the six inch (6") pipe connection shall be made at a depth of four feet-six inches (4'-6"). Extension to the fire hydrants construction may be required to bring the hydrant to proper grade.
 7. All ferrous metal shall be satisfactorily and at all times protected by a durable coating paint. All metal surfaces not buried in the earth shall be left clean and well painted to the satisfaction of the City at the completion of the project. **Color shall be red.**

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
- B. Install piping by tunneling, jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- C. 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 piping with caps, plugs, or flanges as required for piping material on plans.
- D. All pipe shall be laid on a solid, dry foundation. Pipe shall be laid true to the lines and grades shown on the Contract Drawings with the bell ends upstream. Each section of pipe shall rest upon the pipe bed the full length of its barrel and for a minimum of one-half its diameter with recesses excavated to accommodate bells and joints. Any pipe which has its grade or joints disturbed after laying shall be taken up and re-laid at the Contractor's expense. The Contractor shall close the ends of all unconnected pipe with a waterproof stopper. Bedding shall be in conformance with the standard detail.
- E. All ductile iron pipe, fittings and accessories shall be new material which has at no time been used for any purpose whatsoever. All pipe, fittings and accessories shall be handled in such a manner to insure delivery to the work site in sound, undamaged condition and conforming in all respects to these specifications. Particular care shall be taken not to injure the pipe coating. No other pipe or material of any kind shall be placed inside of any pipe or fittings at any time after the application of coating.
- F. All pipes and joints shall be installed in accordance with the manufacturer's requirements. When the requirements contained in this specification exceed the manufacturer's specifications, the specifications contained herein shall govern.

3.2 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after thrust blocks have hardened sufficiently, if applicable. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. The Contractor shall provide for hydraulic pressure test of the water main before making the final connection into existing pipes as follows or as required by the authority having jurisdiction:
 - 1. Hydraulic pressure testing shall conform to AWWA Standard C-600.

2. A hydrostatic test pressure shall be maintained in the pipeline for a minimum period of two (2) hours. At the end of the test period, if the test pressure has remained constant, the pipeline shall have passed the test. If the pipe does not hold pressure, the Contractor shall locate the leak, permanently repair the section of piping where the leak is occurring to the satisfaction of the Authority having jurisdiction, and retest the pipe line as specified above. This process shall be repeated until the pipeline has successfully passed the pressure test.
3. Contractor shall make certain that all air is expelled from a pipeline before it is tested. All caps, plugs, and fittings shall be adequately braced and anchored to withstand the test pressures.
4. Hydrostatic test pressure shall be 200 psi or 1.5 times the working pressure measured at the highest elevation in the pipeline under test, whichever is greater.
5. The leakage test may be performed concurrently with the pressure test. If no pressure drop is seen during pressure test, the leakage test may be waived by the authority having jurisdiction.
6. If leakage is encountered during the hydrostatic test, the Contractor shall begin this leakage test which shall be accomplished by increasing the hydrostatic pressure to a specified value and maintaining of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain the specified leakage test pressure after the air in the pipeline has been expelled.
7. The hydrostatic pressure for the leakage test shall be 200 psi.

- C. Prepare reports of testing activities and submit to Owner, NEW JERSEY AMERICAN WATER COMPANY and authority having jurisdiction.

3.3 IDENTIFICATION

- D. Install continuous underground detectable warning tape during backfilling of trench for underground water-service piping. Locate below finished grade, directly over piping. See Division 31 Section "Earthwork" for underground warning tapes.

3.4 WATER SERVICE DISINFECTION

- E. All water pipelines shall be disinfected in conformance with the latest edition of AWWA Standard C-651 for disinfecting water mains prior to being put into service. Hypochlorite and liquid chlorine for use in disinfection shall conform to AWWA Standards B-300 and B-301, respectively.
- F. All pipelines shall be thoroughly flushed before introduction of chlorinating material which shall be done in an approved manner. The amount of chlorine applied shall be such as to provide a dosage of not less than 50 parts per million. The chlorinated water shall be retained in the main for at least 24 hours during which time all hydrants and valves in the section treated shall be operated to be disinfected. The heavily chlorinated water shall then be flushed from the main until the chlorine concentration in the water leaving the main is no

higher than that generally prevailing in the system. The Contractor shall then have samples taken by an approved testing laboratory and bacteriological analyses made. Should the initial treatment prove ineffective, disinfection shall be repeated until satisfactory samples must be obtained.

- G. After final flushing and before the water main is placed in service, a sample or samples shall be collected from the end of the line and along the length of the mains.. If corporation stops for water services are not available or if additional ones are needed to perform bacteriological tests, the Contractor shall install them at no additional cost to the Owner. Upon successful completion of bacteriological tests, the additional corporation stops shall be shut off and abandoned. Samples shall be tested for bacteriological quality in accordance with Standard Methods, and shall show the absence of coliform organisms.
- H. Prepare reports of purging, disinfecting activities and provide bacteria test results and chain of custody documentation to the Owner and authority having jurisdiction.

END OF SECTION 221113