

UNIVERSITY OF NORTH TEXAS

SECTION 211100
FACILITY FIRE SUPPRESSION WATER-SERVICE PIPING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and other Division 1 Specification Sections, apply to this Section

1.2 SUMMARY

- A. This section addresses underground fire-suppression water-service piping (fire mains) and its related components extending from the connection to the public water utility supply tap and extending into the building, as indicated on the approved design drawings.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's specifications for each type of product to be used on project.
- B. Shop Drawings and details indicating locations and depths of underground main and FDC piping; size of pipe, fittings and valves; type of pipe and fittings materials; size, type and location of pressure blocking; type of backfill material(s); type(s) of underground risers; location and type of vaults, backflow devices, flow meters, and yard valves.
- C. Copies of the contracting firm's Texas Department of Insurance (TDI) Sprinkler Contractor Registration – General (SCR-G), Responsible Managing Employee - General (RME-G), Responsible Managing employee Underground (RME-U) and the required Texas Department of Insurance's Liability Insurance Certificate, signed by a Texas Insurance Agent.

1.4 QUALITY ASSURANCE

- A. The contracting firm installing the underground fire main shall specialize in the design and installation of underground fire mains. The firm shall have a minimum of three years of verifiable design and installation experience in underground fire mains.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. The Contractor shall protect all piping materials from contamination during storage, handling and installation. All openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped or at the close of the day's work.
- D. Regulatory requirements:
 - 1. Comply with all requirements of the public water purveyor's, TCEQ and UNT's requirements for connecting to the public utility water main.
 - 2. Comply with NFPA 24 and direction of UNT for materials, installation, tests, flushing, chlorination, valve and associated appurtenances for fire suppression water service piping.
 - 3. Comply with the "Approval Guide," published by FM Global, or UL's "Fire Protection Equipment Directory" for fire-service main products.
- E. Minimum Required Inspections:
 - 1. Visual inspection of the installation shall be performed **PRIOR TO** covering any of the pipe, joints, fittings, valves, ductile iron, thrust blocks, restraints or other metal parts. Where any part is so covered prior to the visual inspection, the contractor will be required to uncover the part(s) for visual inspection at no cost to Owner.
 - 2. Pipe labeling must be turned upward and visible.
 - 3. Depth of bury of the pipe will be measured and verified.
 - 4. All angle fittings shall be pressure blocked with poured-in-place cement pressure blocks or anchored retaining straps. Pressure and gravity anchor blocks shall be appropriately sized per NFPA 24 or by a Texas Professional Engineer and bear onto undisturbed soil.
 - 5. All metal components being installed underground shall be externally coated for corrosion and poly-wrapped.

6. Hydrostatic Testing of the fire sprinkler underground main is required.
 - a. All new fire service mains shall be tested hydrostatically at not less than 200 psi pressure for a minimum of two hours, or at 50 psi pressure in excess of the maximum static pressure when the maximum required static pressure exceeds 150 psi.
 - b. A pressure loss of more than 5 psig, or leaks will result in a failed inspection.
 - c. The Hydrostatic test shall be made by the installing contractor and witnessed by the Owner's Representative.
7. Cleaning, disinfecting, flushing and biological testing:
 - a. Underground fire mains being connected to any potable water utility line must be disinfected, flushed and pass bacteriological testing prior to being connected to any potable water utility line.
 - b. Isolate fire main system from public water utility main with RPZ backflow prevention device.
 - c. Clean new piping system and parts of existing system that have been altered, extended or repaired.
 - i. Use flushing procedure described in NFPA 24 for flushing of pipe.
 - ii. Use disinfecting procedure described in AWWA C651.
 - iii. Once disinfecting test is complete and approved, re-flush the underground piping and perform bacteriological testing.
 - iv. Samples for bacteriological analysis will only be collected from suitable sampling taps and collected in sterile bottles treated with sodium thiosulfate. Samples shall not be drawn from hoses, fire hydrants or unregulated sources.
8. Flushing, disinfecting, re-flushing and bacteriological sampling of lines shall be done by the installing contractor and witnessed by the Owner's Representative.
9. Proper methods and equipment to perform the flush must be used. All piping used to flush must be properly secured or restrained. Owner's Representative must approve of flushing method and equipment.

1.4 COORDINATION

- A. Coordinate location of underground fire main with fire sprinkler contractor, UNT Utilities Supervisor and public water purveyor's requirements. Coordinate FDC location at the direction of the UNT System Fire Marshal.

PART 2 -- PRODUCTS

2.1 WATER PIPING MATERIALS

- A. Underground -- Polyvinyl Chloride (PVC) Pipe (NO EXCEPTION)
 1. American National Standard for PVC pipe 12 inches and under, AWWA Standard C900, Class 200 (DR14).
 2. Pipe greater than 12 inches shall be AWWA Standard C905, Class 200 (DR14).
 3. Color: Blue
- B. Aboveground extension to backflow prevention device
 1. Where the underground fire service pipe emerges from below grade and does not immediately terminate with a control valve and backflow prevention device (double check valve assembly) in a readily accessible location, the above-ground extension of the fire service pipe shall be galvanized steel or stainless steel pipe run to the control valve and backflow prevention device located in a readily accessible location.
- C. Valves:
 1. Gate valves, 12" and under (resilient seated): AWWA C509 Standard
 - a. General Description: Valves shall be full opening, iron body, non-rising stem, resilient seated wedge type so designed to have complete **ZERO** leakage with flow in either direction at pressures up to two hundred (200) psi. The valves shall be designed for throttling if required.
 - b. Coating: Valves shall have all internal ferrous metal surfaces coated with an approved epoxy coating to provide a corrosion resistant barrier. The epoxy coating shall be holiday free with a minimum thickness of not less than four (4) mils. The coating shall be non-toxic after application and shall impart no taste to water.
 - c. Operating stems: Valves shall have two (2) "O" ring stem seals. Valves shall have the thrust collar and bearing surfaces isolated from the waterway and be provided with continuous lubrication, or they shall be provided with non-corrosive thrust bearings above and below the thrust collar. Where the

operating nut exceeds forty eight (48) inches, in depth (below finish grade), a permanently attached extension shall be attached to the valve stem to bring it to the minimum depth of forty-eight (48) inches. All valves shall open by turning to the left and shall have a two-(2) inch operating nut or be hand-wheel operated as shown on the plans.

d. Approved Manufacturers:

- i. Mueller
- ii. Waterous
- iii. Kennedy
- iv. American-Darling
- v. Clow Corporation
- vi. J&S Valves

D. Fittings:

1. Mechanical Joint: ANSI/AWWA-C110/A21.10 or ANSI/AWWAC153/A21.53 Standards
2. Flange Joint: ANSI/AWWA-C111/A21.11 or ANSI/AWWA-C153/A21.53 Standards
3. Push-on Joint: ANSI/AWWA-C111-A21.10 or ANSI/AWWA-C153/A21.53 Standards
4. Fittings: Ductile Iron ANSI/AWWA-C153/A21.53; Cast Iron ANSI/AWWAC110/A21.10 and ANSI/AWWA-C111/A21.11 Standards.
5. Bends: ASTM D-3139. Megalug™ retaining glands or equal shall be used on all bends, tees and plugs
6. Gaskets: ASTM F477 Standards
7. Bolts, Bolt-studs and "T" Head Bolts:
 - a. Length: Shall be such that the ends project ¼ to ½ inch beyond surface of nuts.
 - b. Ends: Chamfer or rounded.
 - c. Threading: ANSI B1.1 coarse thread series, class 2A Fit. Bolt-studs may be threaded full length. Studs for tapped holes shall be threaded to match threading in holes.
 - d. All bolts, bolt-studs and "T" head bolts (ANSI/AWWA C111/A21.11-80) shall be either:
 - i. A242 high strength low alloy steel with enhanced atmospheric corrosion resistance (ASTM A325 Type III); or
 - ii. Stainless Steel Grade 304 or 316 high strength bolts
 - e. All nuts are to be A563 carbon alloy steel; Grade and finish to be C3.

Exception: All-thread rod to be used in thrust harness only, shall be high strength, corrosion-resistant alloy (ASTM A325 Type II) with hexagonal nuts. Where all-thread rods, nuts and washer are used, they are to be painted with "ROYSTON ROSKOTE MASTIC R28" Rubberized mastic as manufactured by ROYSTON LABORATORIES, INC. of Pittsburgh, Pennsylvania or equivalent.

PART 3 - REACTION RESTRAINTS AND THRUST-BLOCKING

3.1 Restraints and thrust blocking for all piping with mechanical coupling, push-on or mechanical joints, or similar joints subject to internal pressure shall be thrust-blocked or restrained per NFPA 13 for Underground Piping to prevent separation of the joints.

1. Thrust-blocking shall be designed (placement, size, cement mix) by the RME or a Texas Registered Professional Engineer and shown on the installation plans.

PART 4 - EXCAVATION

4.1 Excavation: Excavation in general, shall be made in open cut from the surface of the ground and shall be no greater in width and depth than is necessary to permit the proper construction of the work.

- A. Excavating and trenching shall be performed in accordance with State of Texas Law and OSHA requirements.
 1. Underground utilities in the area(s) being excavated shall be located, identified and marked by utility operator. Call TEXAS811 (dial 811), 48 hours in advance of the excavation and request line locates.
- B. The amount of trench excavation to grade shall not exceed 100 (one hundred) feet from the end of the pipe laying operations and no excavation shall be 300 (three hundred) feet in advance of the completed pipe operations (includes backfilling). At the end of the workday, all trench excavation shall be backfilled or surrounded with substantial chain-link fencing at least 6 (six) feet in height, attached to steel poles that are firmly anchored into the ground. Any landscaping, irrigation system, paving or utility that is disturbed, removed,

or damaged during construction shall be replaced to original condition or better by the contractor.

- C. Minimum bury depth: Minimum bury depth shall be forty-eight (48) inches from finished grade to the top of the pipe or as directed by the Owner.
- D. Backfill Compaction:
 - 1. Mechanical Method: Compaction and consolidation of the backfill materials shall be backfilled using the native material free of tree roots, large rocks and other deleterious materials, and compacted to 95 percent of maximum density as determined by ASTM D698 in six (6) inch lifts at optimum moisture content (to plus 4 percent above optimum moisture content) in areas subject to vehicular traffic, within 5 feet of and inside building footprints and other paved areas, and in ten (10) inch lifts in any other areas not specified. Where subject to vehicular traffic, within 5 feet of or inside the building footprint and other paved areas, density tests shall be performed at the rate of one test per 300 LF per one foot of trench depth.
 - 2. Water Jetting Method: Water jetting is not allowed.

END OF SECTION