

SECTION 02420

SITE UTILITIES

PART 1. GENERAL

1.1 Related Documents

- a. The general provisions and documents of the Contract, including General and Special Conditions, apply to the work specified in this Section.
- b. Site Earthwork - Section 02200
- c. Site Drainage - Section 02400
- d. Cast-in-Place Concrete - Section 03300
- e. Construction Drawings

1.2 Tests, Permits, Inspections, and Codes

- a. Sewer and water lines shall be tested before use.
- b. Utility installations shall comply with all applicable local and state codes and with requirements of local sewer and water districts.
- c. All utility installations shall be inspected and approved by the Landscape Architect or Owner's authorized representative before being backfilled and also by utility company inspectors and local code enforcement where applicable.
- d. The Contractor shall obtain and pay for any permits required for this portion of the work.

1.3 Submittals

- a. Refer to Section 02400, Paragraph 1.3.
- b. Product Data: Provide data on pipe materials, pipe fittings, valves, meter pit and accessories.
- c. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

- d. Project Record Documents: Record actual locations of piping mains, valves, connections; thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- e. All materials including pipe, valves, hydrants, etc., shall be subject to approval by the Portland Water District or designated authority.

1.4 Quality Assurance

- a. Perform work in accordance with Portland Water District requirements. The Contractor shall comply with the requirements contained within this section and those contained within the Department's requirements. In the event of conflicting requirements, the more stringent standard shall apply.

1.5 Delivery, Storage and Handling

- a. Unload materials so as to avoid shock or damage. Handle and store all pipe in such a manner as to avoid deterioration or other injury thereto. Place no pipe within pipe of larger size. Store pipe and fittings on sills above storm drainage level and delivery for laying after trenches are excavated. Valves and hydrants shall be drained and stored to protect them from damage.

1.6 Damages

- a. If, during the process of this work, utilities in place are damaged, they shall be restored to their proper condition at no added cost to the Owner.

PART 2. PRODUCTS

2.1 Sanitary Sewer System

- a. The Contractor shall contact and coordinate with the City of Portland, Department of Public Works regarding the complete sanitary sewer system.
- b. Polyvinyl Chloride (PVC) Sanitary Sewer
 - (1) Pipe and fittings shall comply with ASTM D 3034, rated SDR 35. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 3034 classification.
 - (2) PVC Pipe Joints: PVC shall be supplied with the coupling or coupling integrally molded to the pipe barrel. All joints shall be bell and spigot. Fittings and couplings shall be of the "O" ring push on type as required for non-pressure sewer pipe. "O" rings shall conform to ASTM Designation D 1869 - Latest revision.

- (3) Fittings for PVC Sewer Pipe: Where fittings such as tee and wyes are required for service taps, "O" ring, PVC fittings shall be used. The material for the PVC fittings shall be compatible to the pipe material in characteristics.

2.2 Water Distribution System

- a. The Contractor shall contact and coordinate with the Portland Water District regarding the complete water system. Refer to the Portland Water District requirements.

2.3 Thrust Blocks

- a. Blocks shall be concrete of a mix not leaner than 1:2-1/2:5 cement: sand: stone, and shall have a compressive strength of not less than 3,000 psi at 28 days. Concrete for thrust blocks shall be placed against undisturbed earth.
- b. Bedding: As specified in Section 02200.
- c. Cover: As specified in Section 02200.

2.4 Accessories

- a. Concrete for Thrust Restraints: Concrete type specified in Section 03300.

PART 3. EXECUTION

3.1 Trenches

- a. Pipe trench excavation and backfill shall be as specified in Section 02200 - Site Earthwork.

3.2 Pipe Jointing and Pipe Laying: Sanitary Sewer

- a. Pipe Jointing - All joints shall be made in a dry trench and in accordance with the manufacturer's recommendations and the best practices for class of pipe laid. The ends of the pipe shall be wiped clean before making the joint.
- b. Pipe Laying - The pipe shall be accurately laid to the line and grades to the satisfaction of the Landscape Architect or the Owner's authorized representative. Sewer pipe shall be placed on six (6) inches of specified crushed material. The line and grade may be adjusted by the Landscape Architect or his authorized representative or a City Engineering Department representative from that shown on the Drawings to meet field conditions and no extra compensation shall be claimed therefore. Whenever the nature of the material excavated is such as to render it unsuitable for bedding, the Contractor shall furnish suitable material as otherwise provided in these Specifications.

- c. The interior of each length of pipe shall be swabbed and wiped clean before laying the next length. No length of pipe shall be laid until the previous length has had specified material placed and tamped around it to secure it firmly in place to prevent any disturbance. Bell ends shall be laid uphill. Whenever the work is stopped temporarily for any reason whatever, the end of the pipe shall be carefully protected against dirt, water or other extraneous material.
- d. The pipe shall be cut as necessary. Sufficient short lengths of pipe shall be furnished so that pipe shall not be more than four (4) feet in length at points of connection with other piping.
- e. Inspection - Pipe installation shall be subject to inspection by the Landscape Architect or his authorized representative for quality, adherence to line and grade, jointing and proper backfill. Any joint not satisfactory to the Inspector shall be removed and remade to his satisfaction at the Contractor's expense. No pipe shall be backfilled until it has been approved. All work must conform to the City of Portland standards for the sanitary installation.
- f. Safety regulation of the State of Maine and the Federal Government, as applicable, shall be followed in regards to work in trenches and trench excavations.

3.3 Manhole Connection

- a. Neatly cut off main flush with inside of existing manhole where they enter structure walls, and point up irregularities and rough edges with nonshrinking with nonshrinking grout. Shape inverts for smooth flow across structure floor as shown on Drawings. Use concrete and mortar to obtain proper grade and contour and finish surface with fine textured wood float.

3.4 Water Distribution System

- a. Work shall be in accordance with applicable AWWA, 10 State Standards, and Portland Water District Standards.

3.5 Lines and Grades

- a. All mains, valves, and curb stops locations shall be verified by the project engineer.

3.6 Excavation

- a. Excavation for trenches for the placing of water mains, valves, and fittings must be of sufficient width to permit the work to be done in the manner and to the depths specified or as shown on the plans. The trench shall be dug to the required level, and the bottom shaped by hand to conform to the shape of the pipe or appurtenances being installed.

3.7 Pipe Laying

- a. All pipe shall be laid to line as indicated on the Drawings. Pipes shall be laid with a minimum of 5 1/2 feet of cover over the pipe. This depth of cover shall be measured from finished grade. Pipe, fittings and valves shall be carefully handled to avoid damage.
- b. Suitable equipment shall be provided by the Contractor for handling the pipe. Any damage to the pipe in handling or laying shall be at the Contractor's expense. Poured concrete thrust blocks shall be provided for all fittings shown on the Drawings and in accordance with the manufacturer's recommendations.
- c. The Contractor shall install a warning tape in the water main trench that is detectable with an inductive type metal detector. The tape shall be blue and have printing that warns of a water line below. The tape shall be Allen Detectatape, as manufactured by Allen Systems, Inc., of Wheaton, Illinois or approved equal and have a 3" width.
- d. Depth of installation shall be one to two feet below grade. The tape shall be detectable with an inductive type metal detector. Splicing of the tape shall be accomplished with manufacturer furnished metal clips. Where required by the Project Engineer, No. 9 gauge copper wire shall be clipped to the tape and brought to the ground surface or attached to other metal risers.
- e. Unless special anchoring devices are indicated by the Project Engineer, all fittings shall be provided with concrete thrust blocks pured against the fitting and undisturbed earth to insure against disjointing from the pipe when placed under pressure. Concrete for thrust blocks shall be so placed that the pipe and joints will be accessible for repair. Concrete shall consist of one part Portland cement, 2 1/2 parts of fine aggregate, and 3 1/2 parts of course aggregate with just enough water to produce a workable consistency.

3.8 Vertical Separation From Sanitary Sewer

- a. Whenever water mains must cross sewer, lay at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. When the elevation of the sewer cannot be buried to meet the above requirements, center one full length of water main over the sewer so that both joints will be as far from the sewer as possible.

3.9 Inspection

- a. The manufacturer shall certify to the Owner that all pipe and fittings furnished under this contract conform to these Specifications.

- b. Acceptability of pipe shall be determined by results of strength tests and by inspection at point of delivery to determine whether pipe conforms to Specifications in design and freedom from defects. Rejection on results of field inspection may be made on account of any of the following:
 - (1) Variations in any dimensions exceeding permissible variations.
 - (2) Visible cracks, holes, foreign inclusions or other injurious defects.
 - (3) Any pipe or fittings showing a crack and any fitting or pipe which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from work.
 - (4) Variation of more than 1/16 inch per linear foot in alignment of pipe intended to be straight.
 - (5) Insecure attachment of spurs or branches.

3.10 Backfilling

- a. Backfilling shall be done with approved materials free from roots, frozen pieces, rubbish, large clods or stones. Backfill materials shall be placed in trenches evenly and carefully around and over the pipe in layers. Each layer shall be thoroughly and properly compacted.

3.11 Testing

- a. Whenever practical, before the trench has been backfilled or the joints covered, the pipe shall be tested for leaks. The test may also be made with one foot of backfill placed on the pipe, or the pipe may be completely backfilled. All leaks above the allowable maximum shall be repaired, however regardless of when tests are made. The Contractor shall provide all necessary equipment including but not limited to an appropriate pump, water container, pressure gauge, valve, hydrant connection and corporation stop connection, and he shall perform all work required in connection with the test.
- b. Each section tested shall be slowly filled with water, care being taken to expel all air from the mains and service lines, if installed. If necessary, the pipes shall be tapped at high points to vent the air. All foreign material shall then be flushed from the main. If possible, a flushing velocity of fps shall be run through the mains until clean.

- c. The portion to be tested shall be placed under constant 150 percent of working pressure or 100 psi whichever is greater as designated by the project engineer, all leaks shall be repaired, additional tests instituted and continue the process until all major leakages are eliminated. The test pressure shall be at the minimum pressure at highest point in the water line. Further, line test pressure shall not exceed 15% of the pressure rating at the lowest point.
- d. Allowable maximum leakage shall be determined, as follows $L=(ND/ P/7400$, where L = allowable leakage in gallons per hour, N if the total length tested divided by the standard length of pipe, D is the nominal diameter of the pipe in inches and P is the test pressure specified above.
- e. A complete approved pressure test of a minimum of two hour duration will be accomplished prior to disinfection. Obtaining water at the site for testing shall be the Contractor's responsibility.

3.12 Disinfection of Water Mains and Fittings

- a. Disinfection of water mains and appurtenances shall be in accordance with the AWWA Standard C651-86, however, the tablet method is not allowed. Chlorinated water shall be directed along and through all lines and appurtenances to be disinfected until a minimum of fifty ppm of chlorine is detected at representative points throughout the line.
- b. At the end of the 24-hour contact period, a minimum chlorine residual of 5 ppm free chlorine must be detected before disinfection will be considered successful. If unsuccessful, the lines must be re-chlorinated. Otherwise, the line shall be flushed out with clean water until a maximum of 0.4 ppm chlorine residual is detected. All valves and hydrants shall be operated several times during the twenty -four hour contact period. The disinfection water shall be wasted in an environmentally safe manner subject to the approval of the project engineer.
- c. After disinfection, bacteriological samples will be collected and forwarded by the Contractor to a certified lab, such as the State Health Department, for analysis. If positive results are obtained, the system shall be repeated until negative results are obtained.
- d. The method of disinfection and the chlorinating materials used shall be subject to the approval engineer.

3.13 Electric, Telephone and Cable

- a. The Contractor shall coordinate and install underground utilities with Central Maine Power, Verizon, and Time Warner Cable.

- b. The Contractor shall layout and do all excavating and backfilling of trenches for electric, telephone, and cable services, including foundations for light poles and transformers.
- c. Contractor shall confirm all utility company requirements prior to installation, i.e., conduits.

3.14 Gas

- a. The Contractor shall be responsible for the coordination of gas service to the building with Northern Utilities.

3.15 Interference

- a. The Contractor shall be responsible for maintaining proper clearance between adjacent pipes and between pipes and structures. If an interference situation arises, any proposed new routing shall be approved by the Landscape Architect.

3.16 Clean-up

- a. Upon completion of the installation of the sanitary sewers, appurtenant structures, water distribution system and any other work incidental thereto, the Contractor shall remove from the project all equipment, surplus construction materials and debris of any type resulting from the work and shall leave the area in as good or better condition as prior to construction.