

SECTION 02720

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SECTION 02720

STORM SEWER SYSTEMS

PART 1 - GENERAL

Stormwater systems in the City of Saco shall meet the 50 year design storm basis adopted as part of Project Impact and be designed and operated in accordance with the City of Saco Stormwater Management System Operation and Maintenance Guidelines.

1.01 SECTION INCLUDES

- A. Site storm sewerage drainage piping, fittings, and accessories, and bedding.
- B. Connection or providing stubs of building storm water drainage system.
- C. Catch basins, paved area drainage, site surface drainage, and stormwater detention facilities.

1.02 RELATED SECTIONS

- A. Section 02220 - Excavation, Backfilling and Compaction
- B. Section 02270 - Slope Protection and Erosion Control
- C. Section 02605 - Manhole and Catch Basin Structures.
- D. Section 02730 - Sanitary Sewer Systems.
- E. Section 03300 - Cast-in-Place Concrete
- F. Local governing authority and code requirements.
- G. All necessary construction permits.
- H. Construction drawings.

1.03 REFERENCE

- A. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop.
- B. ANSI/ASTM A74 - Cast Iron Soil Pipe and Fittings.
- C. ANSI/ASTM C12 - Practice for Installing Vitrified Clay Pipe Lines.
- D. ANSI/ASTM C14 - Concrete Sewer, Storm Drain, and Culvert Pipe.
- E. ANSI/ASTM C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- F. ANSI/ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- G. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- H. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations Soils and Soil-Aggregate Mixtures Using 10-lb (4.54 Kg) Rammer and 18-in. (457 mm) Drop

- I. ANSI/ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- J. ASTM C700 - Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated.
- K. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- L. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

1.04 DEFINITIONS

Bedding: Fill placed under, beside and directly beside pipe to midpoint of pipe, prior to subsequent backfill operations.

Special Backfill: Fill placed above bedding beside and over pipe prior to other backfill operations.

1.05 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of pipes and mains, connections, catch basins, cleanouts and invert elevations.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 COORDINATION - VACANT

PART 2 - PRODUCTS

2.01 MATERIALS AND ACCESSORIES

Provide any one of the following materials subject to any restrictions noted in this subsection or on plans. The contractor shall provide catalog cuts to the Owner and indicate the proposed materials to be used prior to ordering materials. The approval of the Owner must be obtained prior to ordering materials.

- A. Reinforced Concrete Pipe: Comply with requirements of ASTM C 76, Class IV (***SPECIFICATION WRITER TO VERIFY CLASS OF CONCRETE PIPE***) unless another class type is indicated on Drawings, installed with flexible plastic (Bitumen) gaskets at all joints. Gaskets shall comply with AASHTO M-198 75I, Type B, and shall be installed in strict accordance with pipe manufacturer's recommendations.
- B. Polyvinyl Chloride (PVC) Pipe: 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. Pipe joints shall be integrally molded bell ends in accordance with ASTM D 3034, Table 2, with factory supplied elastomeric gaskets and lubricant. PVC shall not be used for any drainage pipe which will be permanently exposed to sunlight.
- C. Polyvinyl Chloride (PVC) Large Diameter Closed Profile Gravity Sewer Pipe, UNL-B-9: Pipe and fittings shall be installed in accordance with pipe manufacturer's installation guidelines. Acceptable manufacturer: CARLON (Vylon HC). PVC pipe shall not be used for any drainage pipe which will be permanently exposed to sunlight.
- D. Storm drain inlets, outlets, and culverts to include:
 - Rip rapped aprons.
 - Concrete flared inlets/outlets for pipes 18" or larger in diameter.
 - Concrete pipe to be installed in all areas permanently exposed to sunlight including driveway culverts.

- Field cut 45° mitered inlets and outlets for pipes smaller than 18" diameter.
- Bar racks for pipes 18" diameter or larger.

E. Manholes, Catch Basins, Outlet Control Structures, and Water Quality Unit (Refer to Section 02605).

2.02 UNDERDRAIN SYSTEM

- A. Polyvinyl Chloride (PVC) Pipe: The perforated underdrain pipe with ring-tite joints and fittings shall comply with the requirements of ASTM F 758. Holes shall be 120 degrees double row, 1/4 inch diameter at 3 1/4 inch spacing. Underdrain pipe with a filter fabric sleeve shall not be acceptable. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM F 75B classification. Acceptable manufacturers shall be Johns-Manville "Ring-tite" Polyvinyl chloride.
- B. Filter fabric: Filter fabric shall be Mirafi 140 N or approved equal and shall be used around all underdrains.

2.03 INLETS AND CATCH BASINS

- A. Lid and frame per details shown on plans and in accordance with Section 02605.
- B. Catch basin and inlet structures shall be in accordance with Section 02605.
- C. The location of catch basins shall be accurately located by a registered land surveyor. Catch basins shall be located as follows:
1. Edge of frame 6" off face of curb where shown near granite or bituminous concrete curblines.
 2. The center of aisle or parking modules when shown on plans.
 3. In other cases, verify with Engineer.

PART 3 - EXECUTION

3.01 EXAMINATION

Verify that trench cut and excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on civil engineering drawings.

3.02 INSTALLATION - STORM DRAINS

- A. Installation shall begin downgradient and proceed upstream. The pipe shall be accurately laid to the line and grades to the satisfaction of the Engineer. The line and grade may be adjusted by the Engineer from that shown on the Drawings to meet field conditions and no extra compensation shall be claimed therefore.

Firmly support the pipe and fittings on bedding material as shown on the drawings or as specified by these specifications. Do not permanently support the pipe or fittings on saddles, blocking stones or any other material that does not provide firm and uniform bearing along the outside length of the pipe. Thoroughly compact the material under the pipe to obtain a substantial unyielding hand-shaped bed to fully support the pipe. Excavate suitable holes for the joints so that only the barrel of the pipe receives bearing pressure from the supporting material after placement. Do not drive the pipe down to grade by striking it with a shovel, backhoe, or other unyielding object. After the pipe is set to line and grade, place and compact bedding material to hold the pipe alignment. Complete bedding.

The Owner or his representative reserves the right to check the elevations and alignment on any pipe for conformance with proposed line and grade. Installed grades shall be within the tolerance of plus or minus 0.02 feet from theoretical computed grades but in no case shall standing water be allowed in the pipe invert. Alignment shall be within a tolerance of plus or minus 0.04 feet. Pipe grade shall be defined as the invert elevation of the pipe. Pipe not meeting the grade tolerance or of poor alignment shall be adjusted by the Contractor at no additional cost to the Owner.

- B. No pipe laying will be allowed to begin at any point other than a manhole or other appurtenance without the expressed consent of the Engineer. The interior of each length of pipe will be swabbed and wiped clean before laying the next length. No length of pipe shall be laid until the previous length has had sufficient fine material placed and tamped about it to secure it firmly in place to prevent any disturbance. Bell ends shall be laid uphill. Whenever the work is stopped temporarily, or for any reason whatsoever, the end of the pipe shall be carefully protected against dirt, water, or other extraneous material. Bedding shall be as shown on the Plans.
- C. The pipe shall be cut as necessary for appurtenances. In general, the pipe material shall be cut by using a saw or milling process, approved by the pipe manufacturer and not by using any impact device, such as a hammer and chisel, to break the pipe. The pipe shall be cut, not broken. The cut end of the pipe shall be square to the axis of the pipe and any rough edges ground smooth.
- D. Clean interior of all pipe thoroughly before installation. When work is not in progress, open ends of pipe shall be closed securely, in a manner approved by the Engineer, to prevent entrance of trench water, dirt, or other substances.
- E. All joints shall be made in a dry trench in accordance with the manufacturer's recommendations.
- F. A minimum of two (2) pipe lengths or pipe stubs shall be used between any two (2) appurtenances.
- G. When connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each connection with existing pipe at time and under conditions which least interfere with operation of existing pipeline service. Provide facilities for dewatering and for disposal of water removed from dewatering lines and excavations without damage to adjacent properties.

3.03 INSTALLATION-UNDERDRAIN SYSTEM

- A. Pipe Laying: Underdrain system pipe laying shall comply with the requirements of pipe laying described above under "Installation - Storm Drains."
- B. The underdrain pipe shall be installed with holes facing up unless otherwise noted on the plans.
- C. Filter fabric shall be used around all underdrains. The filter fabric shall completely encapsulate the piping and a bedding and backfill of 3/4 inch crushed stone. The use of fabric sleeves for underdrains without stone shall not be permitted.

---END OF SECTION 02720---