

## SECTION 33 41 00

## STORM DRAINAGE

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Description of work: Provide labor, materials, equipment, and services necessary for proper and complete installation of the storm drainage system as indicated on the Drawings and as herein specified including the following items:
  - 1. Storm drainage piping.
  - 2. Catch basins, field inlets, and drain manholes.
  - 3. Drainage swales.
  - 4. Tree Filter Inlet
  - 5. Cleanouts.
  - 6. Bedding and cover materials.
  - 7. Underdrains.
  - 8. Footing Drains.
  - 9. Roof drains.
  - 10. Related appurtenances.
- B. The Contractor shall pay all fees associated with connection to the existing utilities and inspections by the Town.
- C. Related Sections:
  - 1. Section 31 02 00 – Development Permits
  - 2. Section 31 02 10 – Subsurface Investigations
  - 3. Section 31 10 00 – Site Preparation
  - 4. Section 31 20 00 – Earthworks
  - 5. Section 31 25 00 – Erosion Control

## 1.2 REFERENCES

- A. The “Standard Specifications” referred to herein is the book entitled “Standard Specifications” published by the State of Maine Department of Transportation dated December 2002, as supplemented.

## 1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data indicating pipe, pipe accessories, and appertenances.
- C. Shop Drawings: Submit Product Specification Literature and/or Shop Drawings for:
  - 1. Precast concrete structures (manholes, catch basins, and area drains).
  - 2. Cast iron frames, grates and covers for structures.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

## 1.4 CLOSEOUT SUBMITTALS

- A. Comply with Section 01 73 00 - Execution Requirements: Requirements for submittals.
- B. Project Record Documents:
  - 1. Accurately record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations.
  - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

## 1.5 QUALITY ASSURANCE

- A. Comply with the requirements of Section 01 40 00 – Quality Requirements.
- B. Documents affecting Work of this Section include, but are not necessarily limited to; the Conditions of the Contract, General Conditions, Supplementary Conditions, Addenda, and all Sections of Division 1 are hereby made a part of this Section.
- C. Coordinate Work with that of other trades affecting or affected by Work of this Section. Cooperate with such trades to assure the steady progress of the Work.
- D. All Work shall comply with the requirements of the Maine Department of Environmental Protection standards, the Cumberland County Soil & Conservation District Standards, U.S. Environmental Protection Agency NPDES, and City of Portland, Maine Permit requirements, to minimize adverse environmental impacts. Reference is made to the Erosion and Sedimentation Control Report and Plan included in the Plan set for this project. Strict adherence to the Specifications and Plans is required in order to prevent adverse downstream impacts.
- E. Work shall be accomplished in accordance with regulations of local, county and state agencies and national or utility company standards as they apply.
- F. The Contractor shall bear all cost associated with correcting any Work that does not meet the requirements of this Section or any damages to property outside the limits of Work.

## 1.6 PRE-INSTALLATION MEETINGS

- A. Comply with Section 01 31 00 – Project Management and Coordination: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

## 1.7 COORDINATION

- A. Comply with Section 01 31 00 - Project Management and Coordination: Coordination and project conditions.
- B. Coordinate the Work with termination of storm sewer connection outside building, trenching, connection to foundation drainage system, and connection to the roof drain systems.

## PART 2 - PRODUCTS

## 2.1 STORM DRAINAGE PIPING

- A. Polyethylene Pipe (HDPE): High density polyethylene pipe conforming to AASHTO M294-97, Type S and/or AASHTO M252, Type S and/or AASHTO MP7-97. Pipe shall be smooth bore. Type "C" pipe shall be perforated on top with 5/8" holes at 30°, 2 ft. on center.
- B. Pipe shall be joined with the bell-and-spigot joint meeting AASHTO M252, AASHTO M294-97 OR MP7-97. The joint shall be silt tight and nonrated watertight. Gaskets shall be made of polyisoprene meeting the requirements of ASTM F477 with the addition that the gaskets shall not have any visible cracking when tested according to ASTM D1149 after 72 hour exposure in 50 PPHM ozone at 104° Fahrenheit. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.
- C. Pipe and fitting material shall be high-density polyethylene meeting ASTM D3350 minimum cell classification 324420C for 4" through 10" diameters or 335420C for 12" through 60" diameters.

## 2.2 UNDERDRAIN AND FOOTING DRAIN PIPING

- A. Pipe: Perforated PVC Schedule 40 (ASTM D1785) or approved equivalent. Sizes as shown on Drawings.
- B. Drainage Filter Fabric: Non woven, continuous filament fibers of polypropylene; Amoco 4551 or approved equivalent.

## 2.3 ACCESSORIES

- A. Mortar: One part Portland Cement, Type IIA, two parts mortar sand, and clean water as required: MDOT Section 705.02.

## 2.4 UNDERGROUND PIPE MARKERS

- A. Warning Tape: 3" wide detectable tape with foil aluminum core. Tape shall be bright and have a warning message including the words "Storm Sewer".

## 2.5 CATCH BASINS, DRAINAGE MANHOLES, FIELD INLETS, AND TREE FILTER INLET

- A. Precast Concrete Structures: ASTM C478, MDOT Section 712.06. Structures and top pieces shall provide H-20 load bearing capacity. Butyl rubber gaskets shall be installed at all joints between manhole sections.
- B. Brick: ASTM C32-69, Grade MS, except Grade SS for drainage manhole inverts; MDOT Section 704.01.
- C. Concrete Block: ASTM C-139; MDOT Section 704.03.

- D. Structure walls: 5 in. thick for precast up to 10 ft. depth; 8 in. thick for precast below that depth.
- E. Grout: Specified in Section 03 30 00.
- F. Cast Iron Frames, Grates, and Covers: ASTMA48, Class 35, MDOT Section 712.07.
  - 1. Grates in paved areas shall be "bicycle safe".
  - 2. Covers shall have the word "Storm" cast thereon.
  - 3. All components shall be H-20 rated.
  - 4. All frames, grates and covers shall have two coats of coal tar pitch varnish applied after sandblasting to provide a smooth, tough, non-brittle, non-scaling finish. Repair damage to coatings to the satisfaction of the Engineer.
  - 5. Drain Manholes: Standard Solid Cover - 24 in. round opening; E245S, manufactured by Etheridge Foundry Co., except M248S (heavy-duty) in paved areas or approved equivalent.
  - 6. Catch Basin: Standard 24 in. round opening; SA 248 M or SA 246 M where cover requirements dictate use of shorter frame.
  - 7. Field Inlet: E245G, Round frame and grate by Etheridge Foundry Co.

## 2.6 BEDDING AND COVER MATERIALS

- A. Per Section 31 20 00 - Fill Schedule.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Comply with Section 01 73 00 - Execution Requirements: Verification of existing conditions before starting work.
- B. Verify trench cut base is ready to receive work and excavations, dimensions, and elevations are as indicated on the Drawings.

### 3.2 PREPARATION

- A. Notify "Dig-Safe" (1-888-334-7233) at least 3 days prior to beginning any excavation work, in accordance with Maine State Law.
- B. Contact local utility companies, before beginning work.
- C. Check for conflict with underground utilities or structures. Notify the Architect/Engineer immediately or all discrepancies before proceeding with the work.
- D. Fully coordinate with utility companies to insure timely work by others to avoid construction delays.
- E. Hand trim excavations to required elevations. Correct over excavation with Structural Fill as specified in Section 31 20 00.
- F. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

### 3.3 BEDDING

- A. Excavate pipe trench in accordance with Section 31 20 00 for Work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 inches compacted depth.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.

### 3.4 INSTALLATION - PIPE

- A. Excavate in locations and to depths indicated on the drawings to install drain lines.
- B. Install pipe, fittings, and accessories in accordance with ASTM D2321. Seal joints watertight.
- C. Place pipe on minimum 6 inch deep bed of bedding material as specified.
- D. Lay pipe to inverts noted on drawings in straight lines and constant slopes.
- E. Install bedding material at sides and over top of pipe. Install top cover to minimum compacted thickness of 12 inches, compact to 95 percent.
- F. The remainder of the trench shall be backfilled according to Section 31 20 00 – Fill Schedule.
- G. Refer to Section 31 20 00 for backfilling and compacting requirements. Do not displace or damage pipe when compacting.
- H. Connect to roof drain and foundation drain outlet from building.
- I. Connect underdrain systems shown on the drawings.
- J. After all site work is completed, including spreading of topsoil and seeding, clean silt, stones and debris from all structures and lines.

### 3.5 INSTALLATION - CATCH BASINS, DRAINAGE, MANHOLES, FIELD INLETS, AND TREE FILTER INLET.

- A. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings.
- B. Construct all catch basins, manholes, field inlets and other structures to lines, grades and dimensions shown on Drawings.
- C. Inverts for drainage manholes shall be built to the crown of the pipe for sizes up to eighteen (18) inches, and to the spring line for larger pipes.
- D. Cut inlet or outlet pipes flush with inside wall unless otherwise indicated.
- E. Set metal or polypropylene fittings, including rings and frames, in full mortar beds.

## 3.6 DRAINAGE SWALES

- A. Drainage swales shall be excavated and shaped to the lines and grades shown on the Drawings. Suitable material excavated from the ditches and ponds may be used to construct berms, or as site fill for subgrade, as specified in Section 31 20 00.
- B. Swales and ponds shall be lined with rip-rap, jute matting, sod, or loamed and seeded, as indicated on the plans and/or as specified in Section 31 25 13 – Erosion Control.
- C. Swales shall be constructed and maintained as described in the Erosion Control and Sediment Report and as shown and detailed in the Plan Set.
- D. Stormwater Treatment Structures shall be constructed as indicated on the plans. Refer to appropriate details for installation instructions.

## 3.7 FIELD QUALITY CONTROL

- A. Comply with Section 01 40 00 - Quality Requirements.
- B. Comply with Section 01 73 00 - Execution Requirements.
- C. Request inspection prior to placing aggregate cover over pipe.
- D. When tests indicate work does not meet specified requirements, remove work, replace and retest.

## 3.8 PROTECTION OF FINISHED WORK

- A. Comply with Section 01 73 00 - Execution Requirements: Protecting finished Work.
- B. Tree Filter Inlet must be protected with measures indicated in the drawings. Back flow prevention must be installed prior to planting. Inundation by sea water during abnormal high tides can result in the damaging or death of the planting.
- C. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.
  - 1. Take care not to damage or displace installed pipe and joints during construction of pipe supports, backfilling, testing, and other operations.
  - 2. Repair or replace pipe that is damaged or displaced from construction operations.

END OF SECTION