

PEARL PLACE 2

SECTION 334000 - STORM DRAINAGE UTILITIES

PART 1 GENERAL

- 1.1 DESCRIPTION OF WORK: Furnish and install storm sewer system as shown on the Drawings. This includes:
- A. Stormdrain piping
  - B. Repairs to existing pipe damaged during construction
  - C. Underdrain pipe
  - D. Precast manholes, catch basins and precast concrete structures and their appurtenances as called out on the plans
  - E. Insulation and/or concrete encasement as necessary for utility crossings
  - F. Foundation drain and back flow preventer
  - G. Connection to existing systems
  - H. Installation of rain garden stormwater treatment system and all associated appurtenances
- 1.2 REFERENCES
- A. Specification Sections:
    - 1. Earth Moving: Refer to Section 31 20 00
    - 2. Erosion and Sedimentation Controls: Refer to Section 31 25 13
  - B. State of Maine Department of Transportation "Standard Specifications – Revision of December 2002"
  - C. State of Maine Department of Transportation "Supplemental Specifications – Corrections, Additions & Revisions to Standard Specifications – Revisions of December 2002"
- 1.3 SUBMITTALS
- A. Manufacturer's product data and installation instructions.
  - B. Certified copies of tests on pipe units.
  - C. Construction Records: Record depth and location of the following:
    - 1. Stormdrain pipe and structure locations and elevations

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2. Repairs to existing pipes.
3. Underdrain pipe locations and connection points to storm drainage system, and elevations.

Record neatly in a permanently bound notebook and submit at Substantial Completion. Provide access to records for ENGINEER at all times. Submit copies to ENGINEER on a weekly basis.

## PART 2 - PRODUCTS

### 2.1 PIPE AND FITTINGS

- A. General: Provide fittings of same type and class of materials as pipe. Fitting must have single piece gasket.
- B. PVC Non-Pressure Pipe and Services (Storm Drain): 4- through 15-inch Diameter: ASTM D3034 or ASTM D3033, 18- through 27-inch Diameter: ASTM F-679, strength requirement SDR 35; push-on joints, ASTM D3212; gaskets, ASTM F477.
- C. Underdrain Transport Pipe: Underdrain pipe shall be perforated PVC pipe, conforming to the material requirements for PVC storm drain pipe. Underdrain shall be MDOT Type B or Type C underdrain as shown on the plans.
- D. Reinforced Concrete Pipe: ASTM C76; Class IV, O-ring gasket joints with rubber gaskets, meeting MDOT specifications.
- E. Ductile Iron Pipe: AWWA C151; thickness Class 52 AWWA C150; double cement lined, AWWA C104; push-on joints or mechanical joints with rubber gaskets, AWWA C111; fittings, AWWA C110.

### 2.2 PRECAST CONCRETE STRUCTURES

- A. Base Sections: Precast monolithic construction with steps.
- B. Barrel Sections: Precast with steps.
- C. Top Sections: Precast eccentric cone with steps.
- D. Steps: Polypropylene reinforced with steel rod. Meet OSHA requirements, minimum width 16-inches. Cast into concrete.
- E. Pipe to Structure Connections: Connections shall be watertight, expandable pipe sleeve with adjustable expansion ring equal to Press-Boot by Press-Seal Gasket Corp., Fort Wayne, Indiana.

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- F. Joints Between Precast Sections: Watertight, shiplap-type seal with two rings of one-inch diameter butyl rubber sealant.
- G. Inverts: Provide inverts as shown on the Drawings. Configuration to be as required by connecting pipes and as shown on Drawings.

### 2.3 PLASTIC AREA DRAINS

- A. Provide 2-foot diameter plastic area drains, by Nyloplast, or approved equal

### 2.4 FRAMES, COVERS, AND GRATES

- A. Material: Cast iron, ASTM A48 Class 30
- B. Provide frames, covers and grates as identified on the plans

### 2.5 MISCELLANEOUS

- A. Flexible Couplings: Use and location shall be approved by ENGINEER.
- B. Pipe Supports: Saddle type, steel, painted, adjustable, by ITT Grinnell, or approved equal.
- C. Marking Tape: Lineguard III by Tri-Sales, Inc., 2-inch wide, green; detectable with magnetic locators, or approved equal.
- D. Rigid Insulation: Extruded closed-cell rigid foamed polystyrene, 2-inch thickness, width of trench, Styrofoam HI-60, by Dow Chemical, or approved equal.
- E. Frost Barrier: U.V. resistant, high grade polyethylene, minimum thickness six (6) mils.
- F. Joint Sealants:
  - 1. Butyl Rubber Sealant: One (1) inch diameter strips manufactured by Kent Seal, or approved equal.
  - 2. Butyl Rubber Caulking: Conform to AASHTO M-198, Type B.
- G. Foundation Drain Back Flow Preventer: 4-inch PVC extendable backwater valve manufactured by Clean Check, Inc. or approved equal

### 2.6 RAIN GARDEN

- A. Rain Garden underdrain backfill shall meet the requirements specified in Section 31 20 00 Earth Moving.
- B. Rain Garden underdrain pipe shall meet the requirements specified in Paragraph 2.01 of this section.

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- C. Overflow drain shall be plastic area drain as specified in Paragraph 2.03 of this section.
- D. Geotextile fabric shall be nonwoven fabric, Mirafi 170N, or equal
- E. Filter media layer shall include:
  - 1. 6" non-clayey, loamy topsoil such as USDA sandy loam topsoil with 5-8" humified organic matter
  - 2. 12" loamy coarse sand
- F. Wood Mulch shall consist of a moderately fine, well composted bark free of refuse, physical contaminants and material toxic to plant growth mulch.
- G. Plantings shall be as specified on the drawings

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF GRAVITY PIPE AND FITTINGS

- A. Methods: Install in accordance with manufacturer's recommendations. Use a laser beam for line and grade unless otherwise permitted by the ENGINEER. Secure each length of pipe with bedding before placing next length. Plug open ends when work is suspended. Bed pipe as shown on Drawings. A 30-inch minimum cover over the top of PVC pipe and DI pipe should be provided before the trench is wheel-loaded.
- B. Grade and Line:
  - 1. Lay pipe to line and grade shown on the Drawings. If grade is not shown, determine elevations of start and finish points for each run of pipe. Lay pipe to a uniform grade between these points.
  - 2. Line and grade may be adjusted by the ENGINEER as required by field conditions.
- C. Conditions: Lay pipe in the dry. Do not use installed pipe to remove water from work area.
- D. Flush and clean all pipe and remove all debris and materials. Flushing and cleaning methods approved by ENGINEER. Gravity flushing is not acceptable.
- E. Connections to Manholes and Catchbasins: Provide short length of pipe so that joints are located within 3 feet of inside surface of manholes and catch basins for all pipe.
- F. Underdrain:
  - 1. All work shall conform to the Drawings and MDOT SECTION 605 – UNDERDRAINS

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- G. Foundation Drain: Provide 4-inch diameter, perforated PVC pipe around perimeter of proposed building. Wrap drain in minimum of 6 inches of crushed stone bedding and nonwoven filter fabric as detailed.
- H. Foundation Drain Back Flow Preventer: Install foundation drain back flow preventer in accordance with the Drawings.

### 3.2 INSTALLATION OF MANHOLES/CATCH BASINS

- A. Placement: Place precast bases and structures on compacted bedding material so bottom of structure is plumb and pipe inverts are at proper elevations. Place manhole barrel and top sections in the appropriate height combinations. Plug all lifting holes inside and out with non-shrink grout. Construct manhole inverts in accordance with Drawings.
- B. Joints: Follow manufacturer's instructions for sealing joints between precast sections. Provide two rings of 1 inch diameter butyl rubber sealant. Point joints inside and out with butyl caulk.
- C. Frame and Covers:
  - 1. Set to final grade as shown on the Drawings and as specified. Provide adequate temporary covers to prevent accidental entry until final placement of frame and cover is made.
  - 2. Use two rings of 1 inch diameter butyl rubber sealant between frame and rubber riser. Provide downward force to frame so as to compress the joint, provide a watertight seal, and prevent future settlement. Point compressed joint with butyl rubber caulk sealant.
  - 3. Set manhole frames and covers to final grade only after pavement base course has been applied, or after final grading of gravel roads.
- D. Inverts: As specified in paragraph 2.02G of this section.
- E. Steps: Replace any steps that are out of plumb and proper horizontal placement.
- F. Frost Barriers: Wrap each manhole to the maximum excavation depth or not less than 6 feet below grade, with a minimum of four layers of 6 mils each of the polyethylene.
  - 1. Clean manhole exterior of all dirt and remove any protrusions.
  - 2. Apply a 6-inch wide vertical strip of bituminous waterproofing adhesive from the top of manhole to the greatest excavation depth, but not in excess of 6 feet.
  - 3. Start poly wrap at adhesive strip and proceed around manhole continuously, overlapping adhesive strip a minimum of 24 inches on the final layer.
  - 4. Tuck and pleat poly at top in a continuous manner, minimizing size of folds. Extend poly past top of manhole frame and temporarily tuck remainder inside frame, until final backfill and paving.

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5. Paved areas: Cut poly flush with manhole rim after pavement is in place.
6. Unpaved areas: Pull loose ends of poly together, remove excess air and tie off end with galvanized wire. Bury with manhole below grade.

### 3.3 UTILITIES TO BE ABANDONED

- A. Close open ends of abandoned underground utilities which are not indicated to be removed. Provide sufficiently strong closures, such as caps or brick and mortar, acceptable to ENGINEER to withstand hydrostatic or earth pressure which may result after ends of abandoned utilities have been closed. CONTRACTOR may remove abandoned utilities with written permission of ENGINEER.

### 3.4 INSULATION

- A. Install as shown on Drawings.
- B. Provide 2-inch minimum thickness compacted sand layers for stormdrain, directly above and below insulation.

### 3.5 TESTING OF STORMDRAINS

- A. General: Inspect all stormdrain pipes after backfilling. Perform inspection in presence of ENGINEER. A maximum of 1000 feet of pipe may be installed but not tested at any time.
- B. TV Inspection: All stormdrains may be inspected by the OWNER using TV pipe inspection. Defects in materials and/or workmanship found during the inspection shall be corrected by the CONTRACTOR.
- C. Repair all pipes not passing inspection, using materials and methods approved by the ENGINEER, and retest.

### 3.6 RAIN GARDEN INSTALLATION

- A. Rain gardens shall be constructed in an excavation conforming to the lines and grades depicted on the plans and detailed within the Contract Documents. Any modifications to the elevation, shape or location of the rain garden, or any component of the rain garden, shall be at the direction of and approval of the Engineer.
- B. Contractor shall limit compaction of subgrade prior to installation of the drainage and filter materials. Subgrade shall be mechanically raked with a toothed or "ripper-type" excavator bucket prior to installation of backfill in order to open subgrade and promote infiltration. Alternative methods must be approved by the engineer.

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- C. Nonwoven geotextile fabric shall be placed at the sides and bottom of the excavation to separate the filter layer and underdrain layers from the adjacent soil. Large tree roots must be trimmed flush with the side walls in order to prevent fabric puncturing or tearing during installation procedures. Fabric shall be placed to prevent soil from migrating into and clogging the filter. All seams shall have a minimum of 12 inches overlap. Contractor shall not wrap fabric over top of pipe bedding material, as fabric in this zone will cause clogging and prevent flow from percolating between the filter media and the underdrain media.
- D. Perforated underdrain pipe shall be bed, perforations down, in underdrain gravel. Underdrain shall be bed with at least 4 inches of underdrain gravel above and below the pipe. Underdrain pipe shall be bed with slope as shown on plans.
- E. Soil filter media shall be a minimum of 6" non-clayey topsoil over 12" loamy coarse sand, placed above the underdrain gravel. A 2" transition layer of the topsoil shall be rototilled into the loamy coarse sand. The soil filter media shall be lightly compacted. The Contractor should avoid excessive compaction of the soil filter media during installation and should utilize wide track or marsh track equipment or light equipment with turf tires if travel on soil filter media is necessary. Up to 20% natural compaction may occur in the soil filter. The contractor shall presoak the placed soils to speed up the natural compaction process. Final grades shall confirm to lines and grades depicted on the plans. The finish surface grade of the soil filter media shall be level.
- F. Sideslopes of the underdrained soil filters shall be constructed in accordance with lines and grades depicted on the plans. Sideslopes shall be loamed and sodded in accordance with Section 616 Sodding.
- G. Vegetation shall be per the landscaping plans. Rain garden grass shall mowed no more than twice annually.
- H. Erosion Control: The soil filter media must not be installed until the entire area that drains to the rain garden has been permanently stabilized with pavement or other structures unless the runoff is diverted around the filter. The area that drains to the rain garden shall be kept stable, avoiding erosion and deposition of sediments into the stormwater management system. Absolutely no runoff is to enter the rain garden until all contributing drainage areas have been sufficiently stabilized.

END OF SECTION 334000