

SECTION 02722

STORM SEWERAGE SYSTEMS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Storm Sewer.
- B. Catch Basins and Manholes.
- C. Manhole Tee Connection.
- D. Sleeve.
- E. Gate Valve and Valve Box.
- F. Abandon and Fill Existing Storm Sewer.
- G. SDR 26 P.V.C. Drain Tile.
- H. MDOT Concrete Headwall Detail.
- I. 4 inch Perforated C.P.T. w/Sock.
- J. Storm Water Management Units.

1.2 RELATED SECTIONS

- A. Section 02140 – Dewatering.
- B. Section 02225 – Trenching.
- C. Section 02223 – Backfilling.

1.3 REFERENCES

- A. ANSI/ASTM C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- B. ANSI/ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- C. ANSI/ASTM C478 - Precast Reinforced Concrete Manhole Sections.
- D. ANSI/ASTM C507- Reinforce Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.
- E. ANSI/ASTM D2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
- F. ANSI/ASTM D2729 - Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- G. ANSI/ASTM D3033 - Type PSP Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

- H. ANSI/ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- I. ASTM D1785 - Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120.
- J. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- K. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.
- L. MDOT Standard Specifications for Construction – 2003 Edition.

1.4 UNIT PRICE - BASIS OF MEASUREMENT

- A. Storm Sewer:
 - 1. Basis of Measurement: At the unit price bid per lineal foot of storm sewer being installed as stated in the proposal.
 - 2. Basis of Payment: Includes all material, labor, and equipment necessary for trenching, dewatering, backfilling, bedding (both granular and crushed aggregate), pipe, installation, fittings, tees, sleeves, end sections, bulkheading of abandoned sewers and filling with flowable fill, relocation of buried lines and cables, filter fabric, ties to existing tiles, connection of sump leads, tees, branch connections, and accessories as stated in the specifications and indicated on the plans. Polymer Coated C.S.P. in Div. III will be install only.
- B. Catch Basins and Manholes:
 - 1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material, and equipment necessary for trenching, backfilling, dewatering, bedding, structure installation connection to sewer piping, adjusting rings, castings, gates, helical piers if required, and shop drawings. Catch basins and manholes complete as shown on the plans and as stated in the specifications.
- C. Manhole Tee:
 - 1. Basis of Measurement: At the unit price bid for each as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material, and equipment necessary for trenching, backfilling, dewatering, bedding, structure installation connection to sewer piping, manhole tee complete as shown on the plans and as stated in the specifications.
- D. Sleeve:
 - 1. Basis of Measurement: At the unit price bid for each as stated in the proposal.
 - 2. Basis of Payment: Includes labor, materials, and equipment to complete connection.
- E. Gate Valve and Valve Box:
 - 1. Basis of Measurement: At the unit price bid for each as stated on the proposal.
 - 2. Basis of Payment: Includes labor, materials, and equipment to complete connection.
- F. Abandon and Fill Existing Storm Sewer:
 - 1. Basis of Measurement: At the unit price bid per lineal foot or included in the item being installed as stated in the proposal.
 - 2. Basis of Payment: Includes all the labor, materials, and equipment to fill in the storm sewer pipe with material.

- G. SDR 26 P.V.C. Drain Tile:
 - 1. Basis of Measurement: At the unit price bid per lineal foot as stated in the proposal.
 - 2. Basis of Payment: Includes all material, labor, and equipment necessary for trenching, dewatering, backfilling, bedding, pipe, installation, fittings, tees, sleeves, end sections, removing or flowable filling of abandoned tiles, relocation of buried lines and cables, filter fabric, ties to existing tiles, connection of sump leads, connection to house sump, tees, branch connections, and accessories as stated in the specifications and indicated on the plans.

- H. MDOT Concrete Headwall Detail:
 - 1. Basis of Measurement: At the unit price bid for each as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material, and equipment necessary to excavate, furnish, form, and cure the concrete headwall per the appropriate MDOT detailed standards (see Attachment A). Also, includes the hinged gates and all hardware required to attach the gate to the headwall. Holes shall be drilled in pipe at the rate of 1 square inch per linear foot of pipe and then fabric wrapped prior to installation.

- I. 4 inch Perforated C.P.T. with Sock:
 - 1. Basis of Measurement: At the unit price bid per lineal foot of perforated C.P.T. installed as stated in the proposal.
 - 2. Basis of Payment: Includes all material, labor, and equipment necessary for placing perforated C.P.T. with sock in trench and making all connections as necessary to install as shown on the plans. Also includes connecting to the storm sewer manhole and manhole/catch basin as shown on the plans. All trenching, dewatering, backfilling, bedding, and storm sewer installation shall be paid for in the storm sewer pay item.

- J. Stormwater Management Unit:
 - 1. Basis of Measurement: At the unit price bid per each as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material, and equipment necessary to excavate, install the storm water quality units, connect to the catch basins, compact, and restore the surface. Includes all header and lateral piping necessary to connect the units to the upstream and downstream manholes.

1.5 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.6 SUBMITTALS

- A. Submit under provisions of Section 01300 - Submittals.
- B. Submit shop drawings and product data for all items to be installed and/or constructed within this Section.
- C. Submit manufacturer's instructions for all items to be installed and/or constructed within this Section.

1.7 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700 - Contract Closeout.
- B. Accurately record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations.

- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.8 REGULATORY REQUIREMENTS

- A. Conform to applicable code for materials and installation of the Work of this Section.
- B. Conform to applicable standards for pipe and fitting identification markings.

1.9 FIELD MEASUREMENTS

- A. Verify that field measurements and elevations are as indicated.

1.10 COORDINATION

- A. Coordinate Work under provisions of Section 01039 - Coordination and Meetings.

2. PART 2 PRODUCTS

2.1 SEWER PIPE MATERIALS

- A. Reinforced Concrete Pipe: ASTM C76 with premium joints. Class of pipe shall be as indicated on the plans.
- B. Polymer Coated C.S.P.: Dual wall corrugated steel pipe. Dual wall pipe shall be constructed with an outer corrugated shell with an interior smooth liner. The outer shell shall be corrugated Galvanized Steel pipe conforming to ASTM A760 and ASTM A444 with 1"x3" corrugations. The inner smooth interior liner shall be constructed of polymer coated steel conforming to A742 and shall have the polymer coating on the interior only. St. Regis Culvert, Inc. is an acceptable manufacturer of Dual Wall corrugated steel pipe. Pipe joints shall be soil tight.
- C. Polymer Coated Steel: The polymer shall be composed of polyethylene and acrylic acid copolymer - labeled TRENCHCOAT protective film, or Engineer approved equal. The polymer coating shall be a minimum 10 mils thick.
- D. 36 inch diameter Polymer Coated C.S.P. in Div. III and I will be install only, Pipe will be supplied by the owner.
- E. Catch basin lead: SDR 26 PVC, to be used as indicated on the plans. Plastic pipe must be perforated at the rate of 1 square inch per linear foot and shall have a sock.
- F. Polyethylene Tubing: ASTM D-2239, flexible type, 2 inches in diameter for sump pump lead extensions.
- G. Heavy Duty Corrugated Polyethylene Tubing: ASTM F667, flexible type, smooth interior, dual wall, perforated, push-on type joints, with required fittings. Plastic pipe must be perforated at the rate of 1 square inch per linear foot and shall have a sock.
- H. Perforated Corrugated Plastic Tile (C.P.T.): Single wall perforated HDPE Corrugated pipe with sock per ASTM F405 with soil tight joints – per AASHTO Standard Specification for highway bridges.
- I. Storm Water Management Units: Hancor Storm Water Quality Unit, 48 inch diameter with 3 24" diameter access/cleanout ports. All connection joints shall be water tight. Installation shall be in accordance with Division 3.4 of this specification Section.

2.2 PIPE ACCESSORIES

- A. Fittings: Same material as pipe, molded and formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.
- B. Filter Fabric: As specified in Section 02279 - Filter Fabric.
- C. Couplings: Flexible, elastomeric PVC sleeve with stainless steel clamps and bands, for connecting proposed and existing services. As manufactured by Fernco Joint Sealer Co. or equivalent.
- D. Plugs: Furnished by the pipe manufacturer for the specific use with that pipe as approved by the Engineer.
- E. Precast Concrete End Section: Conforming to MDOT standards, MDOT detail R-86-C.
- F. MDOT Headwall: Conforming to MDOT standards, MDOT detail R-85-C.
- G. Polymer Coating Patch: Manufacturer shall provide a field applied patch for polymer coating damaged during construction.

2.3 MANHOLES, CATCH BASINS, AND ACCESSORIES

- A. Concrete barrel and conical top and flat top sections. (Nominal Diameters of 3 feet to 10 feet).
 - 1. Reinforced, precast concrete riser section conforming to ASTM C-478.
 - 2. Nominal inside diameter as indicated on the plans.
 - 3. Precast reinforced concrete base, or integral base, as indicated on the plans and approved by Engineer.
 - 4. Tongue and groove premium joints with o-ring gaskets.
- B. Steps shall be steel reinforced polypropylene.
- C. Poly (Vinyl Chloride) (PVC) Catch Basins shall be Nyloplast Structures as manufactured by ADS, or Engineer approved equivalent.

2.4 MANHOLE TEES AND ACCESSORIES

- A. Pipe and Barrel section to be cut to shape when cast.
- B. Barrel to be set on mainline section.
- C. Reinforcing mesh of each component shall be lapped and welded.
- D. Area of exposed reinforcing mesh to be filled and finished with Speed-Crete or equivalent.
- E. Steps shall be steel reinforced polypropylene.
- F. Barrel Sections.
 - 1. Reinforced, precast concrete riser section conforming to ASTM C-478.
 - 2. Nominal diameter as indicated on the plans.
 - 3. Tongue and groove premium joints with o-ring gaskets.

2.5 MANHOLE, CATCH BASIN, AND MANHOLE TEE COVERS AND FRAMES

- A. Castings as indicated on plans.

2.6 FILL MATERIAL

- A. Bedding/Backfill Materials: See Section 02225 – Trenching.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that trench cut excavation base is ready to receive Work and excavations, dimensions, and elevations are as indicated on layout plans.

3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fill material specified in Section 02225 – Trenching.
- B. Remove large stones or other hard matter, which could damage piping or impede consistent backfilling or compaction.
- C. Cut out soft areas of subgrade not capable of insitu compaction. Backfill with MDOT 6A course aggregate and compact to density equal to or greater than requirements for support of pipe or structure and subsequent backfill material.
- D. Excavate pipe trench in accordance with Section 02225 – Trenching, for Work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated allowing for bedding thickness.

3.3 BEDDING

- A. Place bedding material at trench bottom, in accordance with Section 02225 – Trenching.
- B. Maintain optimum moisture content of bedding material to attain required compaction density.
- C. Dig out for pipe bells.

3.4 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with ASTM Standards and manufacturer's instructions.
- B. Place pipe on specified bedding. Lifting equipment used for pipe installation shall be approved by the manufacturer, prior to construction to verify pipe or coatings will not be damaged.
- C. Lay pipe to slope gradients noted on layout drawings by the use of a laser beam alignment method proven reliable and operated by competent, experienced personnel.
- D. Place remainder of bedding as specified. Do not displace or damage pipe when compacting.

- E. Install and compact backfill according to Section 02223 - Backfilling. Do not displace or damage pipe when compacting.
- F. Contractor shall use appropriate measures, approved by the Engineer to provide a sealed connection between the storm sewer and appurtenances.
- G. Contractor shall use premium joint rubber gaskets for all pipe as indicated on the plans.
- H. Polymer coating damaged during construction may be repaired with field applied patch if approved by the Engineer.

3.5 INSTALLATION - MANHOLES, CATCH BASINS, MANHOLE TEES AND CLEANOUTS

- A. Install according to manufacturer's instructions.
- B. Form bottom of excavation clean and smooth to correct elevation.
- C. Place precast concrete base pad, tee sections, and sections with integral bottoms on 6 inches of Type A, MDOT 6A, compacted bedding.
- D. Level top surface of base pad or tee section to receive concrete shaft sections.
- E. Establish elevations and pipe inverts for inlets and outlets as indicated.
- F. Grout all joints between base pad, pipe connections, and top.
- G. Install barrel sections, cone section, and frame and cover to elevation indicated.
- H. Maximum height from top of cone to bottom of frame shall be 12 inches.
- I. Install stubs and branch connections at locations and elevations. Close ends with approved plug.
- J. Bed stubs and branch connections as indicated on the plans.

3.6 REMOVAL - EXISTING CATCH BASINS AND MANHOLES

- A. Remove existing structures complete at the locations indicated on the plans.
- B. Maintain continuous service in active lines.
- C. Reconnect lines scheduled to remain in service, as indicated on the plans.

3.7 SEWER SERVICES

- A. Do not disturb existing storm sewer services along the limits of the Project.
- B. Provide new sump lead connections as stated in the specifications.
- C. Maintain active services for uninterrupted use.
- D. Connect new sump leads to proposed sewer, as it is installed, with approved pipe and approved coupling for uninterrupted use as shown on the plans.

E. Provide couplings, adapters, and pipe for a complete connection.

F. Locate existing sewer services along the limits of the Project.

3.8 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01400 - Quality Control.

B. Request inspection prior to and immediately after placing aggregate cover over pipe.

3.9 PROTECTION

A. Protect finished work under provisions of Section 01500 - Construction Facilities and Temporary Controls.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION