

SECTION 02542 – UNDERGROUND STORMWATER DETENTION PIPE SYSTEM

PART 1 - GENERAL

1.1 Description of Work

This work shall consist of furnishing and installing an Underground Stormwater Detention Pipe System for use in gravity-flow storm drainage in accordance with the requirements of the contract documents

1.2 Related Work Specified Elsewhere

- A. Section 01330 – Submittal Procedures
- B. Section 01500 – Erosion and Sediment Control and Pollution Prevention
- C. Section 02100 – Clearing and Grubbing
- D. Section 02200 – Earthwork
- E. Section 02202 – Rock Excavation
- F. Section 02500 – Gravity Sewers and Appurtenances
- G. Section 02505 – Storm Sewers and Appurtenances

1.3 American Society for Testing and Materials (ASTM) Reference Specifications

- A. ASTM A536: Standard Specification for Ductile Iron Castings
- B. ASTM F2881: Standard Specification for 12 to 60 in. [300 to 1500 mm] Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications
- C. ASTM D3212: Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- D. ASTM F477: Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- E. ASTM F1417: Standard Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air
- F. ASTM F2487: Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Corrugated High Density Polyethylene and Polypropylene Pipelines
- G. ASTM D2321: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

- 1.4 American Association of State Highway and Transportation Officials (AASHTO) Reference Specifications
 - A. AASHTO M330: Standard Specification for Polypropylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter

- 1.5 Applicable Standards and Specifications
 - A. Erosion and Sediment Control (Chapter 57 of the Arlington County Code)
 - B. Utilities (Chapter 26 of the Arlington County Code)
 - C. Stormwater Management (Chapter 60 of the Arlington County Code)
 - D. Virginia Erosion and Sediment Control Handbook
 - E. Arlington County Stormwater Management Ordinance Guidance Manual
 - F. Arlington County Pre-Storm Erosion and Sediment Control Checklist
 - G. Arlington County Planning & Field Guide for Pollution Prevention (P2)
 - H. Arlington County Department of Parks and Recreation Design Standards

- 1.6 Submittals
 - A. Contractor shall submit to the Project Officer shop drawings for the Underground Stormwater Detention Pipe System, including pipes, joints, fittings, tees, bends, risers, and other accessory equipment. Drawings shall include principal dimensions, location of piping and unit foundation.
 - B. Contractor shall submit Manufacturer's Installation Instructions to the Project Officer.
 - C. Contractor shall submit the manufacturer's Operation and Maintenance Manual to the Project Officer.
 - D. Contractor must photo-document construction phases; contractor must submit a clear, scanned copy of all material receipts and certifications; contractor must schedule all required inspections.
 - E. The Contractor shall submit the following documentation electronically to the project officer with each progress payment request and within 30 business days of the post-construction meeting.
 - 1. Receipts and deliverables - the contractor shall submit materials delivery tickets for each material used in the Underground Stormwater Detention Pipe System construction. The tickets must be legible and if submitted electronically, scanned copies must be of at least 300 dpi resolution.
 - 2. Documentation - installation of each element (bedding layer, pipe connections, etc.) shall be photographed and the corresponding elevation of each installed element shall be provided in the Final Topographic Survey. Photographs shall be of sufficient resolution and quality to clearly depict the intended subject. Photos shall be a minimum size of 300

dpi and 900 x 600 pixels in size. The following below-grade bmp elements shall be documented at a minimum:

- a. Ripping of the bottom excavation
- b. Excavation extent
- c. Installation of bedding layer
- d. Installation of impermeable liner and geotextile fabric
- e. Installation of maintenance risers
- f. Installation of each grade control structure (weir wall)
- g. Installation of Class I or II material, placed and compacted in accordance with ASTM D2321 in pipe zone
- h. Installation of all pipe connections

- F. Final Topographic Survey - at the end of construction, the contractor shall submit a field run topographic survey prepared by a licensed professional surveyor in electronic CAD file format. The survey shall include the following at a minimum:
1. Inflow (inlets, curb cuts, etc.) elevations and locations
 2. All inlets and outlets
 3. Grade control structure (such as weirs) elevations
 4. Associated storm structures and pipe connections
 5. Surface grading of the Underground Stormwater Detention Pipe System

1.7 Substitutions: Any proposed equal alternative product substitution to this specification must be submitted for review and approved by the Project Officer 10 days prior to bid opening. Review package should include maintenance instructions. The system must be an Underground Stormwater Detention Pipe System and contain 12- through 60-inch (300 to 1500 mm) pipes which shall meet ASTM F2881 or AASHTO M330.

1.8 Permits

- A. For street right of way construction the contractor shall obtain all necessary permits prior to initiating construction. The contractor must implement the traffic control/maintenance of traffic (MOT) plan and pedestrian safety plan to include temporary pedestrian access and traffic control devices to include flag persons, signage, keeping pathways clear of vehicles and equipment, etc. All must be in accordance with the US Department of Transportation Federal Highway Administration's "Manual on Uniform Traffic Control Devices" or the Virginia Department of Transportation's "Virginia Work Area Protection Manual."

PART 2 - PRODUCTS

2.1 Stormwater Pipes:

- A. Subject to compliance with requirements, provide products by the following or approved equivalent:
1. ADS HP Storm 48" Pipes, or approved equal
- B. Polypropylene compound for pipe and fitting production shall be impact modified copolymer meeting the material requirements of ASTM F2881, Section 5 and AASHTO M330, Section 6.1.

- C. The Stormwater pipes shall be of a type that has been installed and in use for a minimum of five (5) consecutive years preceding the date of installation of the system. The manufacturer shall have been, during the same consecutive five (5) year period, engaged in the engineering, design, and production of systems deployed for the detention of storm water runoff and which have a history of successful production, acceptable to the Project Officer and the assigned maintenance staff.
- D. Stormwater pipe requirements:
 - 1. The Stormwater pipes pipe shall have a smooth interior and annular exterior corrugations.
 - 2. 12- through 60-inch (300 to 1500 mm) pipe shall meet ASTM F2881 or AASHTO M330.
 - 3. Manning's "n" value for use in design shall be 0.012.

2.2 Stormwater Pipe – Joints:

- A. Pipe shall be joined using a bell & spigot joint meeting the requirements of ASTM F2881 or AASHTO M330. The joint shall be watertight according to the requirements of ASTM D3212. Gaskets shall meet the requirements of ASTM F477. Gasket shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly. 12- through 60-inch (300 to 1500 mm) diameters shall have an exterior bell wrap installed by the manufacturer.

2.3 Stormwater Pipe – Fittings:

- A. Fittings shall conform to ASTM F2881 or AASHTO M330. Bell and spigot connections shall utilize a welded or integral bell and valley or inline gaskets meeting the watertight joint performance requirements of ASTM D3212.

2.4 Maintenance Risers:

- A. Subject to compliance with requirements, provide products by the following or approved equivalent:
 - 1. Nyloplast Inline Drain, or approved equal
- B. Solid Covers and Frames shall be ductile iron per ASTM A536 Grade 70-50-05.
- C. Concrete slab min. 18" around Solid Covers shall be AASHTO H-20 (8") min. thickness.
- D. Drainage connection stub joint tightness shall conform to ASTM D3212 for corrugated HDPE & SDR 35 PVC.

2.5 Contractor Provided Components (below ground installation):

- A. All contractor-provided components shall meet the requirements of this section, the plans specifications and contract documents. In the case of conflict, the more stringent specification shall apply.

- B. Foundation: Where the trench bottom is unstable, the Contractor shall excavate to a depth required by the Project Officer and replace with suitable material as specified by the Project Officer. As an alternative and at the discretion of the Project Engineer, the trench bottom may be stabilized using a geotextile material (as applicable).
- C. Bedding: Suitable material shall be Class I or II per ASTM D2321. The Contractor shall provide documentation for material specification to the Project Officer. Minimum bedding thickness shall be 6" (152 mm) min.
- D. Initial backfill: Suitable material shall be Class I or II in the pipe zone extending not less than 6" (152 mm) above crown of pipe. The Contractor shall provide documentation for material specification to the Project Officer. Material shall be installed as required in ASTM D2321, latest addition.
- E. Cover: Minimum cover over all detention systems is 24" (610 mm) of cover for 42-60" (1050-1500 mm) diameter pipe, measured from top of pipe to bottom of flexible pavement or to top of rigid pavement. Maximum fill height limited to 8 ft (2.4 m) over fittings for standard installations.

PART 3 - EXECUTION

3.1 Construction

- A. Contractor shall report any conditions encountered during construction that are considered detrimental to Underground Stormwater Detention Pipe System function including but not limited to: high groundwater, off-site sediment, unsuitable soils and inadequate drainage.
- B. Contractor shall secure the Underground Stormwater Detention Pipe System from any runoff from the construction site or disturbed areas. Block curbs or inlets to divert upland drainage areas to prevent runoff from entering the excavated area prior to completion as determined by the project officer. Ensure that no site runoff enters the facility before the drainage area has been stabilized.
- C. Contractor shall ensure no sediment or debris be swept or blown into storm drains or the Underground Stormwater Detention Pipe System. Sediment or debris shall be swept up, bagged and disposed of offsite.

3.2 Suitable Weather

- A. Construction shall be suspended during periods of rainfall or snowmelt. Construction shall remain suspended if ponded water is present or if there is residual soil moisture due to increased potential for soil compaction.
- B. Secure the site from risk of precipitation damages in the event of rain (i.e., cover erodible surfaces such as slopes and edges); take action to divert stormwater away from the work area and temporarily cover all exposed soils with filter fabric or impermeable sheeting; cover all staged material in the event of rain and at the close of each work day.

3.3 Sequence of Construction

- A. Pre-Construction Meeting – the Project Officer shall schedule an Underground Stormwater Detention Pipe System specific pre-construction meeting at the site. Contractor attendance is required.
- B. Pipe System:
 - 1. The Underground Stormwater Detention Pipe System shall sit on bedding no less than 6”, of which the material is Class I or II.
 - 2. The initial backfill shall be material Class I or II, not less than 6” above the crown of pipe.
 - 3. Inlet and outlet pipes, bends, tees, stubs, and risers to be connected according to requirements and specifications. All connections to be watertight.
- C. Clean Up:
 - 1. Remove all excess materials, rocks, roots, or foreign material, leaving the site in a clean, complete condition approved by the Project Officer. The project site shall be clean and free of dirt and debris and the Underground Stormwater Detention Pipe System shall be free of construction debris and sediment before the allowing runoff to enter and place the system in operation. All components shall be free of any foreign materials including concrete and excess sealant.

3.4 Final Topographic Survey and Photo Documentation

- A. The Contractor shall provide a Final Topographic Survey and photographs per submittals section.

3.5 Construction Inspection

- A. The contractor shall be required to have the Project Officer inspect the project at critical stages of the construction of the system. The contractor shall notify the project officer at least 48 hours in advance of the necessary inspection. The required inspections are:
 - 1. Following the excavation of the system
 - 2. Following the installation of the pipe system
 - 3. Prior to putting the system online

3.6 Maintenance

- A. Maintenance and Inspection shall be performed in accordance with the manufacturer’s recommendations for maintenance and inspection.
- B. Surface access for personnel and equipment for inspection and maintenance activities shall be provided.

PART 4 - MEASUREMENT AND PAYMENT

- A. Payment for Measurement for the Underground Stormwater Detention Pipe System shall be lump sum. Payment shall include concrete vault and furnishing of all parts, components and equipment

listed in part 2 above, all excavation, compaction, and installation of the device complete and in place in accordance with manufacturers requirements.

- B. Connection of the Underground Stormwater Detention Pipe System to the proposed storm sewer system on site shall be considered incidental to the installation of the device.

END OF SECTION 02542