SECTION 33 46 13

FOUNDATION DRAINAGE

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies materials and procedures for construction of foundation drainage systems, including installation and backfill to a point of connection to drain pipe under the new Access Way.

B. Perforated HDPE underdrains with filer sock encased within sand.

1.2 RELATED WORK

A. Excavation, Trench Widths, Pipe Bedding, Backfill, Shoring, Sheeting, Bracing: Section 31 20 11, EARTH MOVING.

B. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.

C. General plumbing, protection of Materials and Equipment, and quality assurance: Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

D. Submittals: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

E. Pump Units: Section 22 14 33, Packaged, Pedestal Drainage Pumping Units

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Piping.
2. Fittings
3. Filter Sock

C. Certifications:

1. Sand (meets specifications)
2. Filter Sock: Manufacturer’s certification that properties are appropriate for concrete sand.

1.4 DEFINITIONS

Subdrainage: Foundation drainage system that collects and removes subsurface or seepage water from sub-basement access way foundation to discharge point.

1.5 ABBREVIATIONS

A. HDPE: High-density polyethylene plastic.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

1.7 COORDINATION

A. Coordinate construction with construction of new access ways.

B. Coordinate connections to existing pipes with COR.

1.8 QUALITY ASSURANCE:

A. Products Criteria:

1. When two or more units of the same type or class of materials or equipment are required, these units shall be products of one manufacturer.

1.9 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred in the text by basic designation only.

B. American Society for Testing and Materials (ASTM):

A48-03.....Gray Iron Castings

C14-07.....Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe

C33/C33M-11.....Concrete Aggregates

C443-10.....Joints for Concrete Pipe and Manholes, Using Rubber Gaskets

C444-03(2009).....Perforated Concrete Pipe

C578-10a.....Rigid, Cellular Polystyrene Thermal Insulation

C1173-08.....Flexible Transition Couplings for Underground Piping Systems

D448-08.....Sizes of Aggregate for Road and Bridge Construction

D1621-10.....Standard Test Method for Compressive Properties of Rigid Cellular Plastics

D2235-04(2011).....Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings

D2321-11.....Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

D2751-05.....Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings

D3034-08.....Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings

D3350-10a.....Polyethylene Plastic Pipe and Fittings Material

D4491-99a(2009).....Test Methods for Water Permeability of Geotextiles by Permittivity

D4716-08.....Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head

D5926-09.....Poly (Vinyl Chloride) (PVC) Gaskets for Drain, Waste, and Vent (DWV), Sewer, Sanitary, and Storm Plumbing Systems

D6707-06 (2011).....Circular-Knit Geotextile for Use in Subsurface Drainage Applications

F405-05.....Corrugated Polyethylene (PE) Pipe and Fittings

F477-10.....Elastomeric Seals (Gaskets) for Joining Plastic Pipe

F667—06.....Larger Diameter Corrugated Polyethylene Pipe and Fittings

F2648-10.....2 to 60 Inch Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications

1.10 WARRANTY

The Contractor shall remedy any defect due to faulty material or workmanship and pay for any damage to other work resulting therefrom within a period of two years from final acceptance. Further, the Contractor will furnish all manufacturer's and supplier's written guarantees and warranties covering materials and equipment furnished under this Contract.

PART 2 - PRODUCTS

2.1 FACTORY-ASSEMBLED PRODUCTS

A. Standardization of components shall be maximized to reduce spare part requirements.

B. Contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly.

2.2 COMPATIBILITY OF RELATED EQUIPMENT

Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that the result will be a complete and fully operational system that conforms to contract requirements.

2.3 SPECIAL PIPE COUPLINGS

A. Comply with ASTM C1173 for joining underground non-pressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant metal tension band and tightening mechanism on each end.

1. Sleeve Materials:
   a. For Dissimilar Pipes: ASTM D5926, PVC or other material compatible with pipe materials being joined.
2. Unshielded Flexible Couplings: Elastomeric sleeve with stainless-steel shear ring and / corrosion-resistant metal tension band and tightening mechanism on each end.

2.4 SUBDRAINAGE PIPE

A. Pipe shall be flexible, perforated, dual wall HDPE pipe with smooth interior and a corrugated exterior.

B. Pipe and fittings shall be soil tight.

C. Perforations shall be cleanly cut, placed in the valley of the corrugation rib, and uniformly spaced along the length of the circumference of the pipe. Pipe connected by bell and spigot joints shall not be perforated in the area of the bells and spigots.

D. ADS-N12 (perforated) or approved equal.

E. Pipe shall be wrapped in geotextile filter fabric (sock).

F. Pipe size shall be as indicated on the drawings.

G. HDPE piping system shall be specifically designed, constructed, and installed for the service intended.

2.5 SOIL MATERIALS

A. Drainage Material

1. Bedding shall be concrete sand as indicated on the drawings.
2. Fill above subdrainage shall be free draining material.

B. Concrete Sand shall be ASTM C33.

2.6 GEOTEXTILE FILTER FABRICS

A. Geotextile fabric shall conform to ASTM 6707. Elongation will be greater than 50 percent and the flow rate shall range from 110 to 330 gpm/sq. ft. (4480 to 13440 L/min. per sq. m).

1. Structure Type shall be knitted, seamless, geotextile fabric.
2. Style shall be sock.
3. Filter fabric properties shall be adequate for concrete sand, which will encase the perforated pipe and filter sock.
4. Type "A" Knitted Sock Geotextiles by Zodiac Fabrics Company or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PIPING APPLICATIONS

A. Underground Subdrainage Piping shall be:

1. Perforated HDPE pipe and fittings, couplings, and coupled joints.

3.3 FOUNDATION DRAINAGE INSTALLATION

A. Install as indicated on the drawings.

B. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape as recommended by manufacturer and install drainage piping.

C. Place free draining material above foundation drains. Thoroughly compact each layer. Final backfill to finish elevations as indicated on the drawings.

3.4 PIPING INSTALLATION

A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material (sand). Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

1. Foundation Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent, unless otherwise indicated.
2. Lay perforated pipe with perforations down.

3. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

C. Install PE piping according to ASTM D2321.

3.5 PIPE JOINT CONSTRUCTION

A. Cast-Iron Soil Pipe and Fittings: Hub and spigot, with rubber compression gaskets according to ASTM A74. Use gaskets that match class of pipe and fittings.

B. Join PE pipe or perforated PE pipe, tubing, and fittings with couplings for soil-tight joints according to ASTM D2321.

C. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.6 CONNECTIONS

A. Connect subdrainage system to drainage pipe as indicated on the drawings.

3.7 IDENTIFICATION

A. Install detectable warning tape over nonferrous piping and over edges of underground structures.

3.8 FIELD QUALITY CONTROL

Testing: After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

3.9 CLEANING

Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

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