

**SECTION 33 46 00  
SUBDRAINAGE**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. The Work of this Section specifies foundation drainage system, including installation, backfill, and cleanout extensions, to place of connection to onsite storm drain facilities.

**1.2 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples: For each type of filter fabric, pipe, and fitting indicated
- C. Product Data: Certifications from the manufacturers attesting that materials meet specification requirements.

**1.3 RELATED WORK**

- A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Safety requirements: GENERAL CONDITIONS.
- C. Protection of existing utilities, fire protection services, existing equipment, roads, and pavements: Section 01 00 00, GENERAL REQUIREMENTS.
- D. Subsurface Investigation: Section 01 00 00, GENERAL REQUIREMENTS, Article, PHYSICAL DATA.

**1.4 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. Use the latest edition of the referenced publication.
- B. American Society for Testing and Materials (ASTM):
  - D448.....Standard Classification for Sizes of Aggregate  
for Road and Bridge Construction
  - D2737.....Standard Specification for Polyethylene (PE)  
Plastic Tubing
  - F477.....Standard Specification for Elastomeric Seals  
(Gaskets) for Joining Plastic Pipe

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Pipe for subdrainage system shall be of the type and size indicated.  
Appropriate transitions, adapters, or joint details shall be used where pipes of different types or materials are connected.
- B. Perforated Drainage Pipe:
  - 1. Perforated, PE pipe and fittings per ASTM D2737, in NPS 4 to NPS 6.  
Joints shall be coupling type.
- C. Cleanout Extension: ASTM D2729 PVC NPS 6. Gravity Sewer pipes shall have a neoprene gasket joints and long sweep elbow fittings. Cleanouts for underdrains shall be as indicated on the Construction Documents and shall be set so as to not interfere with mowing operations. Plastic tops for cleanouts in landscape areas shall be provided with concrete anchorage with all features set so as to not cause damage to the mowers.
- D. Filter Fabric
  - 1. Non-Woven Filter fabric shall be a pervious sheet of polyethylene or polypropylene filaments formed into a uniform pattern with distinct and measurable openings. The filter fabric shall provide an equivalent opening size (AOS) no coarser than the US Standard Sieve No. 80. AOS is defined as the number of the US Standard sieve having openings closest in size to the filter fabric openings. Permittivity shall be minimum 1.5/second and water flow rate shall be minimum 110 gpm/ft<sup>2</sup>. The filaments shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultraviolet and heat exposure with minimum UV Resistance of 70% retained at 500 hours. The fabric shall have a minimum grab tensile strength of 200 pounds when tested in accordance with ASTM D 4632. Grab elongation shall be 50 percent. Puncture strength shall be 110 pounds when tested in accordance with ASTM D 4833. Mullen burst value shall be minimum 350 psi. Trapezoidal tear shall be minimum 80 lb when tested in accordance with ASTM D 4533. The fabric shall be constructed so that the filaments will retain their relative position with respect to each other.
- E. Drainage Material:
  - 1. Bedding: Drainage fill per Section 31 20 00.
  - 2. Fill: Drainage fill per Section 31 20 00.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

A. Trenching and Excavation

1. Perform required trenching and excavation in accordance with Section 31 20 00 EARTH MOVING. Keep trenches dry during installation of drainage system. Changes in direction of drain lines shall be made with 1/8 bends. Use wye fittings at intersections.

B. Bedding

1. Place graded bedding, minimum 6 inches in depth, in the bottom of trench for its full width and length compacted as specified prior to laying of foundation drain pipe. Each section shall rest firmly upon the bedding, through the entire length, with recesses formed for bell joints. Except for recesses for bell joints, the bedding shall fully support the lower quadrant of the pipe.

C. Pipe Laying

1. Lay drain lines to true grades and alignment with a continuous fall in the direction of flow. Bells of pipe sections shall face upgrade. Clean interior of pipe thoroughly before being laid. When drain lines are left open for connection to discharge lines, the open ends shall be temporarily closed and the location marked with wooden stakes. Perforated pipe shall be laid with perforations facing down. Any length that has had its grade or joints disturbed shall be removed and relaid at no additional cost to the Government. Perforated corrugated polyethylene drainage tubing and plastic piping shall be installed in accordance with manufacturer's specifications and as specified herein. Tubing and piping with physical imperfections shall not be installed.
2. Prior to installation of bedding materials or piping, examination of excavation and subgrades are to be observed by the COTR. Invert elevation of drain pipe shall not be higher than top of lowest floor elevation nor lower than a 45 degree line projected from bottom of any adjacent footing. Lay drain lines and firmly bed in granular material a minimum of 3 inches below invert to top of pipe to true grades and alignment with bells facing upgrade, and to slope uniformly between elevations shown on Construction Documents. Keep trenches dry until pipe is in place and granular material backfill is completed to 1 foot above top of pipe, unless otherwise noted.

3. Install gaskets, seals, sleeves, and couplings according to manufacturers written instructions and per the applicable standard:
  - a. PE and PVC pipe installation shall be per ASTM D2321 and ASTM F758.
  - b. PE joint construction shall be per ASTM D2737 and AASHTO HB17, Division II, Section 26.4.2.4, "Joint Properties."
4. Lay perforated pipe with perforations down. Lay plain end pipe with closed joints held in place with two No. 9 spring steel wire clips at each joint or by standard clay collars.
5. Install cleanout extensions where shown on the Contract Documents.
6. Prior to backfilling, check drain lines to assure free flow. Remove obstructions and recheck lines until satisfactory.

D. Jointing

1. Perforated and porous types of drain pipes shall be laid with closed joints.

E. Backfilling: Place granular material, hand tamped, as indicated on the Construction Documents. Remainder of backfill shall be comparable to existing adjacent soils.

1. Filter fabric shall be installed per the Construction Documents.
2. When drain lines are left open for connection to discharge line, the open ends shall be temporarily closed and their location marked with wooden stakes.

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