

**SECTION 33 46 13**  
**FOUNDATION DRAINAGE**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This section specifies foundation drainage system, including installation, backfill, and cleanout extensions, to place of connection to storm sewer.

**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: Section 00 72 00, GENERAL CONDITIONS, Article, ACCIDENT PREVENTION.
- 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.
- B. American Association of State Highway and Transportation Officials (AASHTO):
  - M6-03.....Fine Aggregate for Portland Cement Concrete
  - M86/M86M-06.....Concrete Sewer, Storm Drain, and Culvert Pipe
  - M175/M175M-05.....Perforated Concrete Pipe
  - M288-06.....Geotextile Specification for Highway Applications
  - T281-06.....Vitrified Clay Pipe
- C. American Society for Testing and Materials (ASTM):

A74-05.....	Standard Specification for Cast Iron Soil Pipe and Fittings
A746-03.....	Standard Specification for Ductile Iron Gravity Sewer Pipe
C14/C14M-05a .....	Standard Specification for Non-reinforced Concrete Sewer, Storm Drain, and Culvert Pipe
C118/C118M-05a.....	Standard Specification for Concrete Pipe for Irrigation or Drainage
C443/C443M-05a.....	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
C444/C444M-03.....	Standard Specification for Perforated Concrete Pipe
D448-03a.....	Standard Classification for Sizes of Aggregate for Road and Bridge Construction
D2321-05.....	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
D2729-03.....	Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
D2737-03.....	Standard Specification for Polyethylene (PE) Plastic Tubing
D3034-06.....	Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
D4216-03.....	Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) and Related PVC and Chlorinated Poly (Vinyl Chloride) (CPVC) Building Products Compounds
F477-02e1.....	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
F758-95(2000) .....	Standard Specification for Smooth-Wall Poly (Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

#### **A. Perforated Drainage Pipe:**

1. Perforated, PE pipe and fittings per ASTM D2737, in NPS 4 to NPS 6 (DN 100 to DN 150). Joints shall be coupling type.

2. Perforated, PE pipe and fittings per ASTM D2737, in NPS 8 to NPS 24 (DN 200 to DN 600). Joints shall be coupling type.
3. Perforated, PVC sewer pipe and fittings per ASTM D2729, in NPS 4 (DN 100) only. Joints shall be bell-and-spigot, loose type.
- C. Cleanout Extension: ASTM A74, cast iron pipe or ASTM A746 ductile iron. Gravity Sewer pipes shall have a neoprene gasket joints and long sweep elbow fittings.
- D. Drainage Conduit:
  1. Pipe, fittings, and couplings shall be perforated and smooth PVC complying with ASTM D4216 and ASTM D2729.
  2. Pipe size shall be 200 mm (8 inches) and have a high minimum flow rate equal to a NPS 4 (DN 100) pipe.
  3. Fittings shall be PVC with NPS 4 (DN 100) outlet connection.
  4. Couplings shall be PVC.
- E. Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with the following properties determined according to AASHTO M 288:
- F. Drainage Mat: Formed three dimensional polyethylene or high-impact polymeric core or compression-resistant nylon matting of open three-dimensional construction.
- G. Drainage Material:
  1. Bedding: River Run Rock, 20 mm (3/4 inch) to No. 4 per ASTM D448.
  2. Fill to 300 mm (1 foot) above pipe: River Run Rock, 20 mm (3/4 inch) to No. 4 per ASTM D448.
- H. Concrete Sand: AASHTO M6.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Laying: 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 75 mm (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 foundation drainage drawings. Keep trenches dry until pipe is in place and granular material backfill

is completed to 300 mm (1 foot) above top of pipe, unless otherwise noted.

1. 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. Concrete piping shall be per ASTM C14/C14M, AASHTO M86/M86M, and ASTM C118/C118M.
  - c. PE joint construction shall be per ASTM D2737 and AASHTO HB17, Division II, Section 26.4.2.4, "Joint Properties."
  - d. PVC joint construction shall be per ASTM D3034 with elastomeric seals gaskets per ASTM D2321.
  - e. Perforated PVC joint construction shall be per ASTM D2729, with loose bell and spigot joints.
  - f. Perforated concrete joint construction, including fittings and gaskets, shall be per ASTM C443/C443M.
2. 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.
3. For foundation subdrainage, install piping level with a minimum cover of 900 mm (3 feet), unless otherwise indicated.
4. Install cleanout extensions where shown on the Contract Documents of at 100' o.c. and all bends.
6. Prior to backfilling, check drain lines to assure free flow. Remove obstructions and recheck lines until satisfactory.
- B. Backfilling: Place a minimum of 300 mm (12 inches) of River Run Rock material, hand tamped, extending in width a minimum of 400 mm (1.5 feet) from building wall. Continue backfill with River Run Rock to within 100 mm (1 foot) of finished grade in planting areas. Remainder of backfill shall be comparable to existing adjacent soils. In bituminous and concrete paving areas, backfill to the bottom of the base course with pervious material.
- C. Filter fabric may be substituted for sand layer.
- D. Vertical drainage mat in conjunction with geotextile may be substituted for sand and drainage material.
- E. 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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