

**DRY SWALES**

These specifications compliment the dry swale design portion of the Iowa Stormwater Management Manual in Chapter 2, Section 2I-3.

Sections of the following documents, as referenced within these specifications, are hereby made a part of these specifications:

- SUDAS Standard Specifications: The standard specifications issued by the Iowa Statewide Urban Design and Specifications Program effective at the date of publication of the Notice to Bidders, unless a different effective date is identified in the contract documents.
- Iowa DOT Standard Specifications for Highway and Bridge Construction: The Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction and the General Supplemental Specifications effective at the date of publication of the Notice to Bidders unless a different effective date is identified in the contract documents.
- American Society for Testing and Materials (ASTM) standards.
- American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Transportation Materials and Methods of Sampling and Testing.

**PART 1 - GENERAL****1.01 SECTION INCLUDES**

Dry Swales

**1.02 DESCRIPTION OF WORK**

Construct dry swales for conveyance and treatment of stormwater runoff.

**1.03 SUBMITTALS**

Comply with the requirements of the contract documents.

**1.04 SUBSTITUTIONS**

Comply with the requirements of the contract documents.

**1.05 DELIVERY, STORAGE, AND HANDLING**

Comply with the requirements of the contract documents.

**1.06 SCHEDULING AND CONFLICTS**

Comply with the requirements of the contract documents.

**1.07 SPECIAL REQUIREMENTS**

None.

**1.08 MEASUREMENT AND PAYMENT**

**A. Class 10, Class 12, or Class 13 Excavation:** Refer to SUDAS Section 2010, 1.08, E for measurement and payment information for Class 10, Class 12, or Class 13 Excavation.

**B. Filter Aggregate:**

- 1. Measurement:** Each type of filter aggregate will be measured in tons based upon scale tickets for the material delivered and incorporated into the project.
- 2. Payment:** Payment will be made at the unit price per ton for each type of filter aggregate furnished and placed.
- 3. Includes:** Unit price includes, but is not limited to, furnishing, hauling, and placing filter aggregate material.

**C. Underdrain:**

- 1. Measurement:** Measurement will be in linear feet for each type and size of pipe installed. Pipe will be measured from end of pipe to end of pipe along the centerline of pipe, exclusive of outlets. The vertical height of cleanouts and observation wells will be included in the length of pipe measured. Lengths of elbows, tees, wyes and other fittings will be included in length of pipe measured.
- 2. Payment:** Payment will be made at the unit price per linear foot for each type and size of pipe.
- 3. Includes:** Unit price includes, but is not limited to, furnishing and placing pipe, cleanouts, observation wells, and pipe fittings.

**D. Engineering Fabric:**

- 1. Measurement:** Measurement will be in square yards for the surface area covered with engineering fabric. Both horizontal and vertical areas covered with engineering fabric will be measured.
- 2. Payment:** Payment will be made at the unit price per square yard of engineering fabric.
- 3. Includes:** Unit price includes, but is not limited to, placing and securing filter fabric and any overlapped areas.

**E. Filter Soil Matrix:**

- 1. Measurement:** Measurement will be the plan quantity in cubic yards, without final field measurement. Adjustments may be made to the plan quantities if agreed to by both the Engineer and the Contractor.
- 2. Payment:** Payment will be made at the unit price per cubic yard of filter soil matrix.
- 3. Includes:** Unit price includes, but is not limited to, furnishing, hauling, blending, and placing filter soil matrix layer.

**PART 2 - PRODUCTS****2.01 FILTER AGGREGATE**

- A. Type 1:** Provide aggregate complying with Iowa DOT Section 4115, Gradation No. 3, Class 2 durability gravel or crushed stone (AASHTO M 43/ASTM D 448, Size 57).
- B. Type 2:** Provide aggregate complying with one of the following:
1. 1/2 inch aggregate complying with Iowa DOT Section 4125, Gradation No. 20 (AASHTO M 43/ASTM D 448, Size 7).
  2. 3/8 inch aggregate complying with Iowa DOT Section 4125, Gradation No. 21 (AASHTO M 43/ASTM D 448, Size 8).

**2.02 UNDERDRAIN**

Provide slotted pipe(s) complying with the requirements for Type 1 Subdrain in SUDAS Section 4040. Provide 4 inch diameter pipe unless otherwise specified in the contract documents.

**2.03 ENGINEERING FABRIC**

Comply with Iowa DOT Section 4196, requirements for subsurface drainage.

**2.04 FILTER SAND**

Provide sand complying with Iowa DOT Section 4110, Gradation No. 1.

**2.05 FILTER SOIL MATRIX**

- A. Compost:** Provide compost complying with the requirements for mulch for pneumatic seeding in SUDAS Section 9010, 2.07.
- B. Sand:** Provide clean sand complying with Iowa DOT Section 4110, Gradation No. 1.
- C. Mixture:** Thoroughly blend sand and compost materials to provide a mixture with 60 to 80% sand by volume.

**PART 3 - EXECUTION****3.01 PRE-INSTALLATION PROTECTION**

- A. Complete grading, utility installation, and other earth disturbing operations prior to excavating the dry swale. Protect dry swale trench from accumulating sediment during rainfall events.
- B. Prior to installing the dry swale, install sediment control practices upstream to protect the dry swale from sediment in stormwater runoff from disturbed soil.

**3.02 DRY SWALE INSTALLATION**

- A. Excavate dry swale to the length, width, and depth specified in the contract documents. Do not compact the bottom of the trench and do not operate heavy machinery on bottom of the trench. Do not operate heavy machinery in the trench while placing filter soil matrix.
- B. Place 2 inches of filter aggregate over the bottom of the trench.
  - 1. If engineering fabric is specified between the filter aggregate layer and the filter soil matrix, utilize Type 1 filter aggregate.
  - 2. If a filter sand layer is specified between the filter aggregate layer and the filter soil matrix, utilize Type 2 filter aggregate.
- C. Install slotted underdrain pipe on top of the filter aggregate. Install cleanouts and observation wells at locations specified in the contract documents.
- D. Place remaining filter aggregate to the top of the underdrain pipe.
- E. If engineering fabric is specified in the contract documents, install over the top of the filter aggregate layer and up the sides of the excavation. Overlap adjacent strips of fabric a minimum of 6 inches.
- F. If a filter sand layer is specified in the contract documents, install over storage aggregate layer to the depth specified in maximum 8 inch lifts. Tamp each lift with a vibratory plate compactor.
- G. Place filter soil matrix in 8 inch to 12 inch lifts to the elevation specified in the contract documents. Lightly compact each layer with one or two passes from a vibratory plate compactor.
- H. Smooth and prepare the finished surface for seeding. Install seeding or plants as specified in the contract documents.
- I. Install rolled erosion control product, bonded fiber matrix, or other surface stabilization practice, as specified in the contract documents, to protect the surface of the swale from erosion.
- J. Upon completion of the dry swale, immediately install sediment control practices as required to protect the swale from sediment in stormwater runoff from disturbed soil.

**3.02 DRY SWALE INSTALLATION (Continued)**

- K. Construct an impermeable soil control berm complying with Figure 1I-3.1, if specified.
- L. Do not stockpile materials on or near the surface of the completed dry swale.
- M. Protect completed dry swale from heavy machinery and other construction equipment.