

SP-097011
(New)



Iowa Department of Transportation

SPECIAL PROVISIONS FOR RAINGARDEN

Harrison County
Project No. SB-IA-CO43(062) - - 2T-43

Effective Date
April 20th, 2010

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

RAINGARDEN

PART 1 - GENERAL

1.1 SUMMARY:

- A. This Section consists of installing bioretention facilities as shown on the Drawings, including all materials, equipment, labor, and services to perform the required work.
- B. Section includes the following:
 - 1. Excavation for Raingarden.
 - 2. Underdrain system.
 - 3. Raingarden soil mixture placement.

1.2 MEASUREMENT AND PAYMENT

- A. Basis of Measurement: The Engineer will measure the square footage of raingarden installed. Unit of measure will be SQUARE FEET (SF).
- B. Basis of Payment: Payment for RAINGARDEN includes all labor, materials, equipment, and supervision required to furnish and install.
- C. Unit Price: Lump Sum for –RAINGARDEN will include, but may be limited too, subgrade preparation, material and installation of weed control barrier, HDPE pipe, crushed stone, soil mixture and other materials and labor required to furnish and install complete and acceptable Raingardens.

1.3 DEFINITIONS - RAINGARDEN: Landscape basin intended to provide water quality management by filtering rainwater runoff before release into storm drain systems.

1.4 SUBMITTALS:

- A. Product Samples:
 - 1. Five pound (5 lb) of each crushed stone type.
 - 2. One pound (1 lb) of compost.
 - 3. One foot (1 Ft) section of pipe.
 - 4. One square foot (1SF) of weed control barrier.
- B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
 - 1. Analysis of Raingarden Soil Mixture (BSM).
 - 2. Planting soil test report.
 - 3. Textural analysis of planting soil.

1.5 PROJECT CONDITIONS:

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
 - 1. Notify Owner not less than seven days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Owner's written permission.
 - 3. Contact utility-locator service for area where Project is located before excavating.

B. Contract Limits:

1. Contract limits are shown on the drawing.
2. Contractor will maintain his construction operation within these limits.
3. Disturbance or damage occurring outside these limits as a result of Contractor's operations will be repaired to original condition at no expense to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Planting Soil: Soil classification of Sandy Loam or Loamy Sand meeting the following criteria:

1. 50 to 85 percent by weight sand (2.0 to 0.050mm) according to AASHTO T88.
2. 5 to 50 percent by weight silt (0.050 to 0.002mm) according to AASHTO T88.
3. 2 to 5 percent by weight clay (less than 0.002mm) according to AASHTO T88.
4. 3 to 10 percent by weight organic matter according to AASHTO T194.
5. Textural Analysis:
 - a. Minimum 100% by weight passing the 2 inch sieve per ASTM E11.
 - b. Minimum 90% by weight passing the No. 4 per ASTM E11.
 - c. Minimum 80% by weight passing the No. 10 sieve per ASTM E11.

B. Organic Compost: Well decomposed, stable, weed free organic matter source. It shall be derived from; agriculture, food, or industrial residuals; biosolids (treated sewage sludge); yard trimmings; source-separated or mixed solid waste meeting the following criteria:

1. 100 percent shall pass through a 3/8 inch screen.
2. pH of 6.0 to 8.5.
3. Moisture content of 30% to 60% by weight.
4. No substances toxic to plants.
5. 1% or less by weight man-made foreign matter.
6. No objectionable odor.
7. Shall not resemble the raw material from which it derived.

C. Raingarden Soil Mixture (RSM): A uniform mix, free of plant residue, stones, stumps, roots, or similar objects larger than 2 inches. Mixture of planting soil, organic compost, and sand consisting of the following:

1. 30% by volume planting soil.
2. 20% by volume organic compost.
3. 50% by volume sand per ASTM C33 Fine Aggregate.
4. Soil shall have an infiltration rates greater than 0.5 inches per hour.
5. The BSM shall be tested per ASTM D4972 and shall meet the following criteria:
 - a. Correct pH of 5.5 to 7.5.
 - b. Magnesium of a minimum of 32 ppm.
 - c. Phosphorus (Phosphate-P2O5) not to exceed 60 ppm plant available phosphorus.
 - d. Potassium (K2O) minimum of 78 ppm.
 - e. Soluble salts not to exceed 500 ppm.

D. Crushed Stone:

1. No 57 Aggregate (1 inch): ASTM 633, double washed to reduce suspended solids.

- 2. No 7 Aggregate (0.5 inch): ASTM 633, double washed to reduce suspended solids.
- E. Underdrain: Flexible, slotted HDPE pipe.
- F. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.

2.2 GEOTEXTILES:

- A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications capable of withstanding normal installation stresses, made from polyolefins, polypropylene, or polyesters.

PART 3 - EXECUTION

3.1 PREPARATION:

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by operations.
- B. Protect and maintain erosion and sedimentation controls during earthwork operations.

3.2 GENERAL:

- A. Raingarden facilities shall not be constructed until all contributing drainage areas are permanently stabilized against erosion and sedimentation per the Contract Documents and to the satisfaction of the landscape Architect.
- B. Any discharge of sediment that affects the performance of the raingarden cell will require reconstruction of the raingarden cell as originally specified to restore its defined performance.
- C. No heavy equipment shall operate within the perimeter of the raingarden facility during under drain placement, backfilling, planting, or mulching of the facility.

3.3 EXCAVATION:

- A. If the raingarden facility is to be used as a sediment basin prior to use as a raingarden facility, it shall be excavated to the dimensions, side slopes, and 1 foot above the bottom of the BSM elevations shown on the Drawings.
- B. Any sediment from construction activities deposited in the raingarden facility shall be completely removed from the facility after all vegetation, including landscaping within the drainage area of the raingarden facility, has been established.
- C. The excavation limits shall be final graded to the dimensions, side slopes, and final elevations shown on the Drawings.
- D. Excavators and backhoes, operating on the ground adjacent to the raingarden facility, shall be used to excavate the facility to the greatest extent possible. Otherwise, excavation shall be performed using low ground-contact pressure equipment.
- E. No heavy equipment shall be used within the perimeter of the raingarden facility before, during, or after placement of the BSM.
- F. Excavated materials shall be used or disposed of in conformance with project specifications.

3.4 UNDERDRAIN:

- A. Verify the subsoil base has been shaped and contoured per the Drawings.
- B. The under drain pipe shall be outletted into a drainage structure, as shown on the Drawings, or where ever possible, a minimum of 6 inches above the normal flow level of the structure an shall be constructed of non-perforated under drain pipe. Pip ends not connected to a structure, or day lighted, shall be capped with a screw cap.
- C. Maintain a minimum cover of 18 inches over all pipe.
- D. The under drain system of pipe, aggregate bed, and geotextile fabric shall be placed according to the dimensions shown on the Drawings.

3.5 PLACEMENT OF BIORETENTION SOIL MIXTURE (BSM):

- A. After placement of the under drain system and before the BSM, the bottom of the excavation shall be rototilled to a minimum depth of 6 inches to alleviate compaction. Any substituted method for rototilling must be approved by the Landscape Architect prior to its use. Any ponded water shall be removed from the bottom of the facility and the soil shall be friable before rototilling.
- B. The BSM shall be placed and graded using low ground-contact pressure equipment, or by excavators and/or backhoes operating on the ground adjacent to the raingarden facility.
- C. No heavy equipment shall be used within the perimeter of the raingarden facility before, during, or after placement of the BSM.
- D. The RSM shall be placed in horizontal layers not to exceed 12 inches for the entire area of the raingarden facility.
- E. The RSM shall be saturated over the entire area of the facility after each lift of the BSM is placed, until water flows from the under drain, to lightly consolidate the BSM mixture. An appropriate sediment control device shall be used to treat any sediment-laden water discharged from the under drain during this process.
- F. Water for saturation shall be applied by spraying or sprinkling in a manner to avoid separation of the RSM components.
- G. Saturation of each lift shall be performed in the presence of the Landscape Architect.
- H. If the RSM material becomes contaminated with sediment or other deleterious material during, or after, construction of the facility, the contaminated material shall be removed and replaced with uncontaminated material at the Contractor's expense.
- I. Final grading of the RSM shall be performed after a 24-hour settlement period. Upon completion of final grading, the surface of the RSM shall be rototilled to a depth of 6 inches.
- J. Final elevations shall be within two inches of the elevations shown on the Drawings.

3.6 PLACEMENT OF WEED CONTROL BARRIER:

- A. Weed-Control Barrier: Install weed-control barrier over the limits of the raingarden facility according to manufacturer's written instructions. Completely cover the area and securely pin the weed-barrier to the underlying soil surface.

3.7 PLANT INSTALLATION:

- A. See Native Seeding.
- B. Do not use pesticides, herbicides, or fertilizer during landscape construction, plant establishment, or maintenance.

3.8 EROSION PROTECTION: The Contractor shall comply with soil erosion control requirements of the Iowa Code, and the National Pollutant Discharge Elimination System (NPDES) Storm Water Program.

3.9 DISPOSAL OF SURPLUS AND WASTE MATERIALS:

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.