



**SPECIAL PROVISIONS
FOR
BIORETENTION CELLS**

**Polk County
HDP-C077(227)--6B-77**

**Effective Date
October 18, 2022**

THE STANDARD SPECIFICATIONS, SERIES OF 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

151166.01 DESCRIPTION.

The purpose of this specification is for construction of bioretention cells for treatment of storm water runoff.

151166.02 MATERIALS.

A. Underdrain

Provide 6 inch diameter pipe complying with the following:

1. Polyvinyl Chloride Pipe and Fittings (Solid Wall PVC):

- a. Comply with ASTM D 3034, minimum thickness SDR 35, 46 psi minimum pipe stiffness.
- b. Use PVC plastic conforming to ASTM D 1784, Cell Classification 12454.
- c. Integral bell and spigot type rubber gasket joint complying with ASTM D 3212 and ASTM F 477.
- d. Slot underdrain pipe according to ASTM F 949 or perforate with four rows of 1/4 inch to 3/8 inch diameter holes along the bottom of the pipe.

2. Corrugated Polyvinyl Chloride Pipe and Fittings (Corrugated PVC):

- a. Use corrugated exterior, smooth interior, PVC.
- b. Comply with ASTM F 949, minimum pipe stiffness, 46 psi.
- c. Use PVC plastic complying with ASTM D 1784, Cell Classification 12454.
- d. Integral bell and spigot type rubber gasket joint complying with ASTM D 3212 and ASTM F 477.
- e. Slot underdrain pipe according to ASTM F 949.

3. High Density Polyethylene Pipe and Fittings (HDPE):

- a. AASHTO M 252 or M 294, Type S corrugated exterior and smooth interior.
- b. Integral bell and spigot joints with O-ring rubber gasket meeting ASTM F 477.

- c. Slot or perforate according to AASHTO M 252, Type SP.

B. Underdrain outlet

1. Comply with material requirements for subdrain outlet, Section 2502.

C. Underdrain cleanout

1. Provide 6 inch solid-wall PVC riser pipe and fittings.
2. Comply with material requirements for solid-wall PVC underdrain.

D. Choker aggregate

1. 1/2 inch aggregate complying with Section 4125 of the Standard Specifications, Gradation No. 20 (AASHTO M 43/ASTM D 448, Size 7) or
2. 3/8 inch aggregate complying with Section 4125 of the Standard Specifications, Gradation No. 21 (AASHTO M 43/ASTM D 448, Size 8).

E. Aggregate subbase

Provide aggregate complying with Section 4115 of the Standard Specifications, Gradation No. 3, Class 2 durability crushed stone (AASHTO M 43/ASTM D 448, Size 57).

F. Modified soil

1. **Organic Material:** Provide suitable organic material composed of products from plant material such as:
 - a. Compost complying with Article 4169.08 of the Standard Specifications
 - b. Finely chipped bark (3/8 inch diameter or less)
 - c. Finely shredded, partially decomposed mulch
 - d. Peat and sphagnum peat moss
 - e. Other organic material provided it has no detrimental chemical compounds, does not have high nutrient content that would increase nutrient loading in leachate, will increase the water holding capacity of the soil media and will enhance the ability of the media to capture and hold pollutants to facilitate breakdown is also acceptable. Compost type and source shall be submitted to the Engineer for approval prior to use.
2. **Sand:** Provide clean sand complying with Section 4110 of the Standard Specifications, Gradation No. 1.
3. **Soil:** Provide soil taken from the top 6 inches of the A-horizon having a dark brown to black color and a granular structure with a clay content less than 25% as verified with a ribbon test that yields no more than 1 inch.
4. **Mixture:** The texture of the modified soil mixture will be loamy sand or sandy loam according to the USDA Soil Classification system, soil textural triangle. A laboratory analysis for particle size or a simplified dispersal method for sand content only can also be used to verify soil texture. Thoroughly blend organic materials, sand and soil to provide a mixture with up to 10% suitable organic material, 75% to 90% sand and up to 25% soil by volume.

G. Splashblock

Provide 24 inch by 24 inch by 2 inch (nominal) concrete paver stone.

H. Mulch, hardwood

Provide shredded hardwood mulch per Section 4170 of the Standard Specifications.

I. Water

Supply potable water for consolidating the modified soil layer. In lieu of potable water, supply clean, clear water, free of harmful contaminants, from a source approved by the Engineer.

J. Modular block retaining wall

1. Comply with Section 2430 of the Standard Specifications.
2. Provide three color samples for review and selection.

151166.03 CONSTRUCTION.

A. Pre-installation protection

1. Complete upland grading, utility installation, inlet structure, overflow structure, outlet pipe and structure, excavation for retaining walls, and other earth disturbing operations prior to excavating for the bioretention cell.
2. Prior to installing the bioretention cell, install erosion and sediment control practices upstream to protect the bioretention cell from sediment in stormwater runoff.

B. Underdrain installation

1. Install underdrain near centerline of bioretention cell.
2. Construct and install A-2 cleanout as shown in plans.
3. Provide pipe bends as required to connect to outlet structure. Do not use bends sharper than 45 degrees.
4. Outlet underdrain through wall of overflow structure. Fill annular space between underdrain and structure with non-shrink grout.
5. Do not install a rodent guard on underdrain outlet.

C. Bioretention cell installation

1. Excavate the bioretention cell area to the length, width, and depth specified in the contract documents. Do not compact the bioretention cell subgrade and do not operate heavy machinery on the subgrade.
2. Place the first two inches of aggregate subbase evenly over the bottom of the bioretention cell.
3. Install underdrain at the specified location. Connect to outlet and install cleanout.
4. Place remaining aggregate subbase over the bottom of the bioretention cell, taking care not to disturb the underdrain.
5. If a choker aggregate layer is specified in the contract documents, install over stone aggregate

subbase layer to the depth specified.

6. Place modified soil in 8 to 12 inch lifts to the elevation specified in the contract documents.
7. Avoid over compaction of the modified soil layer; compact each layer of modified soil matrix by soaking:
 - a. Apply water to uniformly saturate surface by spraying or sprinkling.
 - b. Ensure entire bioretention cell is saturated.
 - c. Add modified soil as required to restore settled surface to finished elevation.
8. Roughen surface of side slopes that are 4(H):1(V) or steeper to reduce potential for rill erosion along equipment tracks.
9. Install landscaping (seed, sod, native plants, trees, shrubs, etc.) as specified in the contract documents.
10. Install casting for underdrain cleanout.
11. Install splashblock:
 - a. Excavate a 4 inch deep by 36 inch wide by 32 inch long area centered on the inlet weir.
 - b. Backfill the area with 2 inches of choker stone and hand tamp to compact.
 - c. Install splashblock on top of compacted stone with one edge tight against the inlet intake and the top surface level with inlet weir.
 - d. Backfill the remainder of the excavation surrounding the splashblock with choker stone and hand tamp.
12. Uniformly grade and rake the top of the modified soil layer to a flat, smooth, uniform surface.
13. When specified in the contract documents, place a 3 inch layer of hardwood mulch over area filled with modified soil. Do not place hardwood mulch over seeded areas. If the contract documents specify plants for the surface of the modified soil, install prior to placing mulch.
14. Ensure good housekeeping measures are taken throughout construction, until final acceptance of improvements by owner, to prevent erosion and sedimentation that could reduce the effectiveness of the bioretention cell. Address any such erosion or sedimentation should it occur, until final acceptance.
15. Do not store materials or operate heavy equipment within or near the footprint of the bioretention cell practice after installation has been completed.
16. Perform topsoil re-spread, fine grading operations, and seedbed preparation as specified in the contract documents.

151166.04 MEASUREMENT AND PAYMENT.

A. Class 10, Class 12, or Class 13 Excavation: Per Section 2102 of the Standard Specifications.

B. Choker Aggregate

1. **Measurement:** Measurement will be the plan quantity in cubic yards, without final field measurement. The plan quantity will be based upon the proposed excavated area to be filled with choker aggregate, in place. 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 choker aggregate.
3. **Includes:** Unit price includes, but is not limited to, furnishing, hauling, placing, and grading choker aggregate.

C. Aggregate Subbase

1. **Measurement:** Measurement will be the plan quantity in cubic yards, without final field measurement. The plan quantity will be based upon the proposed excavated area to be filled with aggregate subbase, in place. 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 foot cubic yard of aggregate subbase.
3. **Includes:** Unit price includes, but is not limited to, furnishing, hauling, placing, and grading aggregate subbase.

D. Underdrain

1. **Measurement:** Each size of underdrain installed will be measured in linear feet along centerline of pipe from end of pipe to end of pipe. Lengths of elbows and fittings will be included in the length of pipe measured.
2. **Payment:** Payment will be made at the unit price for each size of pipe.
3. **Includes:** Unit price includes but is not limited to, excavation, pipe, and fittings.

E. Underdrain Outlet: Per Section 2502 of the Standard Specifications.

F. Underdrain Cleanout

1. **Measurement:** Each underdrain cleanout will be counted.
2. **Payment:** Payment will be made at the contract unit price for each cleanout.
3. **Includes:** Unit price includes the plug at the end of the main, fittings, riser pipe, cap with screw plug, casting, and concrete casting encasement.

G. Modified Soils

1. **Measurement:** Measurement will be the plan quantity in cubic yards, without final field measurement. The plan quantity will be based upon the proposed excavated area to be filled with modified soil. 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 modified soil.
3. **Includes:** Unit price includes, but is not limited to, furnishing, blending, testing, hauling, and placing modified soil and supplying and installing splashblock. If compaction by soaking is specified for modified soil, unit price includes supplying and applying water to compact the material.

H. Mulch, Hardwood: Per Section 2610 of the Standard Specifications.

I. Modular Block Retaining Wall: Per Section 2430 of the Standard Specifications.

J. Splashblock: Incidental to Modified Soils.

K. Surface Roughening: Incidental to Class 10 Excavation.