



**SPECIAL PROVISIONS
FOR
BIORETENTION CELLS**

**Polk County
IM-080-3(274)125--13-77**

**Effective Date
September 15, 2026**

THE STANDARD SPECIFICATIONS, SERIES OF 2023, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

230436.01 DESCRIPTION.

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

230436.02 MATERIALS.

A. Subdrain Cleanout.

Use solid wall PVC riser pipe size of the same diameter as the adjacent subdrain. Use Type A-2 Cleanouts. Refer to detail in plan.

B. Filter Aggregate.

Provide aggregate complying with Section 4115 of the Standard Specifications, Gradation No. 3, Class 2 durability crushed stone.

C. Subdrain.

Provide slotted pipe(s) complying with the requirements of Section 2502 of the Standard Specifications. Pipe size as specified in contract documents, should match diameter of pipe used for subdrain cleanouts.

D. Storage Aggregate.

Provide aggregate complying with Section 4122 of the Standard Specifications, Gradation No. 13a, Class 2 durability.

E. Modified Soil.

1. Organic Material.

- a. Provide suitable organic material composed of products from plant material such as:
 - 1) Compost complying with the following requirements:

- a) Derived from a well-decomposed source of organic matter.
- b) Produced using an aerobic composting process, meeting CFR 503 for time, temperature, and heavy metal concentrations.
- c) No visible admixture of refuse or other physical contaminants, nor any material toxic to plant growth.
- d) Certified by the U.S. Composting Council's Seal of Testing Assurance (STA) program.
- e) Conforms to chemical, physical, and biological parameters of AASHTO MP 10-03, with the following additional requirements:
 - Follow U.S. Composting Council's TMECC guidelines for all testing.
 - Organic Matter Content: 35% minimum.
 - pH: between 5.5 and 9.0.
 - Maturity (growth screening): Minimum 90% emergence for all compost to be vegetated.
 - Particle Size:

Table 230436.02-1: Percent Passing

Sieve Size	Percent Passing
1"	100
3/4"	65-100
3/8"	0-75

- 2) Finely chipped bark (3/8 inch diameter or less)
 - 3) Finely shredded, partially decomposed mulch
 - 4) Peat and sphagnum peat moss
 - b. Other organic material approved by the Engineer 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.
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, have a dark brown to black color, have a granular structure and clay content less than 25% verified with laboratory testing one sample per 200 cubic yards.
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 2% to 10% suitable organic material, 70% to 88% sand and 2% to 30% soil by volume.
- F. 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.
- G. Mulch.**
Per Section 4170 of the Standard Specifications.
- H. Wildflower Seed Mix.**
Supply wildflower seed mix as shown below. Provide nurse crop with seed. Nurse crop to be Avena Sativa Oats.

Table 230346.02-1: Forbs for Wildflower Seed Mix

Botanical Name (Common Name)	% by wt.
<i>Alisma subcordatum</i> (Mud Plantain)	1.32
<i>Allium stellatum</i> (Prairie Onion)	0.99
<i>Ammannia coccinea</i> (Scarlet Toothcup)	0.99
<i>Anemone canadensis</i> (Canada Anemone)	0.66
<i>Angelica atropurpurea</i> (Angelica)	3.97
<i>Asclepias incarnata</i> (Rose Milkweed)	2.65
<i>Astragalus canadensis</i> (Canada Milk Vetch)	0.66
<i>Bidens cernua</i> (Nodding BurMarigold)	0.66
<i>Boltonia asteroides</i> (False Aster)	0.66
<i>Eupatorium perfoliatum</i> (Boneset)	0.50
<i>Eupatorium maculatum</i> (Joe Pye Weed)	0.66
<i>Gentiana andrewsii</i> (Bottle Gentian)	0.36
<i>Gentiana flavida</i> (Cream Gentian)	0.36
<i>Helenium autumnale</i> (Sneezeweed)	0.72
<i>Heliopsis helianthoides</i> (Early Sunflower)	1.32
<i>Hibiscus laevis</i> (Rose Mallow)	3.97
<i>Hypericum pyramidatum</i> (Great St. John's Wort)	0.66
<i>Iris versicolor</i> (Northern Blue Flag)	2.65
<i>Liatris pycnostachya</i> (Prairie Blazing Star)	3.31
<i>Lobelia cardinalis</i> (Cardinal Flower)	0.33
<i>Lobelia siphilitica</i> (Great Blue Lobelia)	1.32
<i>Mimulus ringens</i> (Monkey Flower)	0.33
<i>Oligoneuron rigidum</i> (Stiff Goldenrod)	0.66
<i>Pedicularis lanceolata</i> (Marsh Betony)	0.66
<i>Persicaria punctata</i> (Smartweed)	0.99
<i>Physostegia virginiana</i> (Obedient Plant)	0.72
<i>Pycnanthemum virginianum</i> (Mountain Mint)	0.66
<i>Rudbeckia hirta</i> (Black-eyed Susan)	1.99
<i>Rudbeckia subtomentosa</i> (Sweet Black-eyed Susan)	0.36
<i>Rudbeckia triloba</i> (Brown-eyed Susan)	1.32
<i>Silphium laciniatum</i> (Compass Plant)	0.66
<i>Silphium perfoliatum</i> (Cup Plant)	0.66
<i>Silphium terebinthinaceum</i> (Prairie Dock)	0.66
<i>Symphyotrichum laeve</i> (Smooth Blue Aster)	1.32
<i>Thalictrum dasycarpum</i> (Purple Meadow Rue)	1.99
<i>Verbena hastata</i> (Blue Vervain)	1.32
<i>Vernonia fasciculata</i> (Common Ironweed)	1.32
<i>Veronicastrum virginicum</i> (Culver's Root)	0.66
<i>Zizia aurea</i> (Golden Alexanders)	1.32

Totals of Wildflowers	46.37 %
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Table 230436.02-3: Grasses, Sedges, and Rushes for Wildflower Seed Mix

Botanical Name (Common Name)	% by wt.
Andropogon gerardii (Big Bluestem)	6.62
Bromus ciliatus (Fringed Brome)	5.19
Calamagrostis canadensis (Blue Joint Grass)	0.35
Carex bicknellii (Copper-shouldered Oval Sedge)	1.32
Carex hystericina (Porcupine Sedge)	1.32
Carex stipata (Awl-fruited Sedge)	1.32
Carex vulpinoidea (Brown Fox Sedge)	3.31
Elymus canadensis (Canada Wild Rye)	10.59
Elymus virginicus (Virginia Wild Rye)	10.59
Glyceria grandis (Reed Manna Grass)	1.32
Juncus dudleyi (Dudley's Rush)	0.33
Juncus interior (Inland Rush)	0.29
Panicum virgatum (Switch Grass)	1.32
Scirpus atrovirens (Dark-green Bulrush)	0.72
Scirpus cyperinus (Wool Grass)	0.37
Scirpus validus (Great Bulrush)	0.72
Sorghastrum nutans (Indian Grass)	6.62
Spartina pectinata (Cord Grass)	1.32
Totals of Grasses, Sedges & Rushes	53.63 %

I. Concrete Flume

Supply concrete per Section 2511 of the Standard Specifications.

J. Intake, SW-512, 24 and 36 Inch

Provide in compliance with Standard Road Plan SW-512

K. Intake, SW-507, Modified

Provide in compliance with Standard Road Plan SW-507 and modifications as shown in plans.

L. Manhole, Storm Sewer, SW-401, 48 Inch

Provide in compliance with Standard Road Plan SW-401,

M. Storm Sewer Pipe, Trenched, RCP, 2000D, 15 Inch

Per Section 2503 of the Standard Specifications.

N. Rolled Erosion Control Product

Per Article 4169.10, B of the Standard Specifications.

230436.03 CONSTRUCTION.**A. Pre-Installation Protection.**

1. Complete upland grading, utility installation, and other earth disturbing operations prior to

excavating for the bioretention cell.

2. Construct pre-treatment practices as specified in the contract documents.
3. Prior to installing the bioretention cell, install erosion and sediment control practices upstream to protect the bioretention cell from sediment in stormwater runoff.

B. Bioretention Cell Installation.

1. Complete rough grading activities to 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. Perform topsoil re-spread, fine grading operations, and seedbed preparation as specified in the contract documents.
3. Excavate the trench for the subdrain as specified in the contract documents.
4. Excavate across the bottom of the bioretention cell for placement of the modified soil layer as specified in the contract documents.
5. Prior to the installation of aggregate and modified soil layer, scarify bottom of bioretention cell to a depth of 6 inches. Compaction not to exceed 200 PSI at 6 inches or 1.25 gm/ccm.
6. Verify that the bottom of the subdrain trench is clear of debris or other material and remains at the proper subgrade elevation to allow for subdrain installation.
7. Place the first 2 inches of the storage aggregate subbase evenly over the bottom of the subdrain trench. Do not operate machinery directly on the excavated subgrade of the modified soil layer during storage aggregate subbase or subdrain installation.
8. Install subdrain at the elevation specified in the contract documents. Install cleanouts at locations specified in the contract documents.
9. Place remaining storage aggregate subbase layer to the elevation specified in the contract documents.
10. If a filter aggregate layer is specified in the contract documents, install over storage aggregate subbase layer to the depth specified.
11. Install check dams as specified in the contract documents. Protect subdrain and aggregate subbase layers during check dam construction. Do not operate heavy machinery directly on subgrade of the modified soil layers during check dam installation.
12. Place modified soil in 8 to 12 inch lifts to the elevation specified in the contract documents. Do not operate heavy machinery directly on the subgrade of the modified soil layers during placement. Overfill area with modified soil by 5% of the specified depth to allow for natural settlement.
13. Avoid over compaction by allowing time for natural settlement. If the project schedule does not allow for natural settlement of soil and the contract documents require compaction by soaking, compact the filter soil matrix by soaking as described below:
 - 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.

14. Roughen surface of side slopes that are 4(H):1(V) or steeper to reduce potential for rill erosion along equipment tracks.
15. Perform stabilization measures and install landscaping (seed, sod, native plants, trees, shrubs, etc.) as specified in the contract documents.
 - a. Apply nurse crop at 32 pounds per acre.
 - b. Apply wildflower seed mix at 9.44 pounds per acre; 307 PLS (Pure Live Seed) per square foot.
 - c. Seed as per Article 2601.03, C, 7 of the Standard Specifications.
16. Install side slope erosion and sediment control measures as specified in the contract documents.
17. Uniformly grade and rake the top of the modified soil layer to a flat, smooth, uniform surface.
18. 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 layer, install prior to placing mulch.
19. 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 cells. Address any such erosion or sedimentation should it occur, until final acceptance.
20. Do not store materials or operate heavy equipment within or near the footprint of the bioretention cell practice after installation has been completed.

230436.04 METHOD OF MEASUREMENT.

Each Bioretention Cell will be counted.

230436.05 BASIS OF PAYMENT.

- A. Payment will be at the contract unit price for each bioretention cell.
- B. Payment is full compensation for all excavation, grading, subdrain, subdrain cleanout, storage aggregate, filter aggregate, modified soil, mulch, wildflower seeding, rolled erosion control mats, supply and applying water for modified soils and miscellaneous work to construct bioretention cell. Seeding of grass swales and berms, 15 inch storm sewer pipe, SW-507 modified intake, SW-512 intake, SW-410 manhole, concrete flume and connection of 15 inch storm sewer pipe to storm intakes are not included in this bid item (payment will be made separately for these items).