

CEDAR GROVE SOLUTIONS

LANDSCAPE & CONSTRUCTION SERVICES

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BIORETENTION SOIL MIX

Bioretention Swales and Rain Gardens are attractive landscape features that filter and infiltrate storm run-off. Properly designed swales include 18"-24" depth of Bioretention Soil Mix to allow almost 100% of run-off to infiltrate.

Cedar Grove cooperated with WSU scientists to develop a Bioretention Soil Mix providing:

- High porosity for rapid infiltration.
- A balance of fine particles to filter pollutants and retain moisture for plants.
- Organic matter to promote vigorous plant growth and soil life that decompose pollutants.

CEDAR GROVE BIORETENTION & RAIN GARDEN SOIL MIX

A mix of compost and well-graded aggregate to meet regulations and public agencies' specifications.

Compost: 35-40% volume

Aggregate: 60-65% volume

Infiltration Rate: Meets WDOE requirements of 1-12 inches/hour (ASTM D-2434)

CEDAR GROVE COMPOST

Feedstocks:

80-90% yard waste

10-20% post-consumer food waste

Meets 'Composted Material' requirements in WAC 173-350-220, and US Composting Council Seal of Testing Approval (STA)

Organic Content: 40-60% dry weight basis

Dispersed Bioretention Swales can be a cost-effective alternative to storm sewers or large detention ponds



Bioretention Swales can include diverse plants, depending on site conditions.



Soil and vegetation remove most sediment and contaminants.

LEED Credits from Bioretention Swales:
SS 6.1 – Stormwater Quantity Control
SS 6.2 – Stormwater Quality
WE 1.1 – Water Efficient Landscaping
MR 4: Recycled Content Materials
MR 5: Regional Materials

CEDAR GROVE BIORETENTION SOIL MIX SPECIFICATIONS

BIORETENTION MIX MEETS SEATTLE PUBLIC UTILITIES AND WSU SPECIFICATIONS

Bioretention Soil shall consist of a homogeneous mixture of approximately 2 parts by volume (approximately 65 percent) mineral aggregate to 1 part (approximately 35 percent) fine compost meeting the requirements below. The mixture shall have an organic matter content of 4% to 8% determined using the Loss on Ignition method. **Approved products include Cedar Grove Bioretention Mix.**

MINERAL AGGREGATE FOR BIORETENTION SOIL

Mineral aggregate shall be analyzed by an accredited lab using the sieve sizes noted below; and meet the following gradation:

Sieve Size	Percent Passing
1" inch	100
No. 4	60 - 100
No. 10	40 - 100
No. 40	15 - 50
No. 200	2 - 5

COMPOSTED MATERIAL FOR BIORETENTION SOIL

Compost shall be the result of the biological degradation of recycled plant materials under controlled conditions designed to promote aerobic decomposition, in accordance with WAC 173-350-220; and meet the following physical criteria.

1. Compost shall be tested within 90 days prior to application by an independent laboratory certified by the U.S. Composting Council Seal of Testing Assurance program, using Testing Methods for the Examination of Compost and Composting (TMECC) methods.
2. Compost shall meet the following particle size gradation, using TMECC 02.02-B:

Sieve Size	Percent Passing
1"	100
5/8"	90-100
1/4"	75-100



3. pH shall be between 6.0 - 8.5, using TMECC 04.11-A.
4. Manufactured inert material (concrete, ceramics, metal, etc.) shall be less than 0.5 percent by dry weight, per TMECC 03.08-A.
5. Minimum organic matter content shall be 40 percent by dry weight, using TMECC 05.07A "Loss on Ignition Organic Matter Method".
6. Soluble salt content less than 4.0 mmhos/cm, tested per TMECC 04.10-A.
7. Maturity shall be over 80% per TMECC method 05.05-A, "Germination & Vigor".
8. Stability shall be 7 or below, per TMECC method 05.08-B "Carbon dioxide Evolution Rate".
9. Contain a minimum of 65% by volume recycled plant waste as defined in WAC 173-350-100 as "Yard Waste", "Crop residues" and "Bulking agents"; and 5% to 35% by volume "post-consumer food waste". Composts containing biosolids or manures shall not be used in Bioretention Soils.
10. Carbon to nitrogen ratio shall be less than 25:1 determined using TMECC 04.01 "Total Carbon" and TMECC 04.02D "Total Kjeldhal Nitrogen".

SUBMITTALS

At least 10 Working Days prior to placement of Bioretention Soil, Contractor shall submit to the Engineer the following:

1. Grain size analysis from the past 90 days of the Mineral Aggregate used in Bioretention Soil.
2. STA analysis from the past 90 days for compost used in Bioretention Soil.
3. Organic content test results of the Bioretention Soil.
4. A copy of the compost producer's current STA certification from the U.S. Composting Council.
5. A written statement from the compost producer listing feedstocks by percentage.
6. Two, 5-gallon samples of Bioretention Soil.

CEDAR GROVE BIORETENTION SOIL MIX SPECIFICATIONS

CONT.

GRADING AND EXCAVATION

1. No heavy equipment shall operate in Bioretention cell once excavation begins.
2. No excavation shall be permitted within 6-inches of final sub grade if Engineer determines soil is frozen, excessively wet, or has been subjected to more than ½ inch of precipitation within 48 hours.
3. Contractor shall provide Engineer opportunity to inspect excavated Bioretention cell prior to placement of any soil.
4. Scarify subgrade surface a minimum of 3 inches deep prior to Bioretention soil placement.
5. Any sediment deposited in excavated area by runoff prior to Bioretention soil placement shall be removed by 3-inch minimum over-excavation, and replaced by 3-inches of Bioretention soil at Contractor's expense.
6. No materials or substances shall be placed within the Bioretention cell that may inhibit plant growth, drainage or maintenance.

BIORETENTION SOIL PLACEMENT

1. Bioretention soil shall not be placed until all areas draining to the cell have been stabilized and Engineer gives authorization.
2. Soil placement and consolidation shall not occur when Engineer determines the area receiving Bioretention soil is frozen, excessively wet, or has been subjected to more than ½-inch of precipitation within 48-hours prior.
3. The Contractor shall not place Bioretention Soil until the Engineer has reviewed and confirmed the following:
 - Soil mix delivery tickets show that the full delivered amount of Bioretention Soil matches the product type, volume and Manufacturer named in the submittals.
 - Delivered product visually matches submitted 5-gallon sample.
4. Engineer may inspect any loads of Bioretention soil on delivery, and stop placement if (s)he determines that the soil does not appear to match submittals. The Engineer may require Contractor to test delivered soil to demonstrate that it has organic matter content of 4-8% and approximately equal to submitted samples. All testing costs shall be the responsibility of the contractor.
5. If Engineer determines that delivered Bioretention Soil meets specifications, the soil manufacturer shall be held harmless for any failure of Bioretention systems.
6. Place Bioretention soil in loose lifts using a conveyor belt. Rake soil to final grade.
7. Final soil depth shall be verified only after soil has been consolidated, where Engineer determines slopes allow, to relative compaction of 85-90% of modified maximum dry density (ASTM D 1557) by irrigating each cell to field capacity with water applied using rotary sprinklers, without creating any scour or erosion.

MULCH

1. Bioretention Soil shall be covered with 2 inches of clean wood chip meeting the following particle size specification in all areas where slopes are less than 20%.

Sieve Size	Percent Passing
2"	
1"	70 - 100
5/8"	0 - 50
1/4"	0 - 40

2. Contractor shall notify the Engineer to inspect each Bioretention cell prior to placement of wood chip mulch. If any sediment-laden runoff has entered the cell, the Contractor shall remove the top 3 inches of Bioretention soil and replace with Bioretention soil at the Contractor's expense.