Alternative BMPs for Erosion Prevention & Sediment Control

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The organizing sponsors and presenter does not endorse any of the specific products being highlighted. The goal of this event is to educate the audience on the fact that there are numerous products available to supplement or replace traditional Erosion Prevention and Sediment Control BMPs. There are many BMPs available for use on construction sites to control erosion and prevent offsite sedimentation. All have applications and all have limitations. BMPs should be chosen based upon their applicability to the site and situation.
Traditional BMPs

+ Materials Based
+ Accepted Performance
  + No testing required
+ Silt Fence
+ Rock Check Dams
+ Inlet Protection
+ Sediment Traps
+ Sediment Basins
Traditional BMPs

+ Are These Working??
Performance Based Specifications

+ Standard testing to show effectiveness of BMPs
  + Manufacturers must perform independent ASTM or equivalent testing prior to the product being used.
+ Bench Scale and Large Scale Testing

Photos from TRI Laboratory
Performance Based Specifications

+ Standard testing to show effectiveness of BMPs
  + Manufacturers must perform ASTM or equivalent testing prior to the product being used.
+ Sediment Control BMPs must meet 80% trapping requirement

*Photos Courtesy of ACF Environmental and TRI*
SCDOT Specifications

+ Hydraulic Erosion Control Products (HECPs) #
+ Silt Fence #
+ Rolled Erosion Control Products (RECPs) *
+ Compost #
+ Seeding # (includes Biological Growth Stimulants)
+ Construction Entrance #
+ Sediment Tubes #
+ Inlet Filters#
+ Pipe Slope Drains*
+ Transition Mats *
+ Tied Concrete Block Mats *
+ Sediment Dam / Trap *
+ Polyacrylamides*
+ Dewatering Bag*

# Specs are complete;  * Specs are still in the process of being finalized.
# Hydraulic Erosion Control Products (HECPs)

## 4 Classes

### Type 1

**Physical**
- **Color**: Observed
  - Colored to contrast application area, shall not stain concrete or painted surfaces.

**Organic Matter**: ASTM D2974
- 90% minimum

**Water Holding Capacity**: ASTM D7367
- 400% minimum
  - 500% minimum
  - 600% minimum
  - 700% minimum

**Acute Toxicity**: ASTM 7101
- EPA 2021.0-1 Non Toxic

### Endurance

**Functional Longevity**: SCDOT Approved Testing Methods
- Up To 60 days
  - Up To 90 days
  - Up To 180 days
  - Up To 365 days

### Performance

**Maximum Slope Application**: Observed
- 4.0H:1V
  - 3.0H:1V
  - 2.0H:1V
  - 1.0H:1V

**Rainfall Event (R-factor)**: ASTM D6459
- NA
  - 75 < R
  - 140 < R
  - 175 < R

**Cover Factor**: ASTM D6459
- ≤ 0.50
  - C ≤ 0.10
  - C ≤ 0.05
  - C ≤ 0.01

**Vegetation Establishment**: ASTM D7322
- 200% minimum
  - 300% minimum
  - 400% minimum
  - 500% minimum
Hydraulic Erosion Control Products (HECPs)

Photos Courtesy of Profile Products
Rolled Erosion Control Products (RECPs)

+ Temporary Erosion Control Blanket ECB

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Temporary ECB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional Longevity</td>
<td>SCDOT Testing Methods</td>
<td>Up to 12 months</td>
</tr>
<tr>
<td>Maximum Slope Application</td>
<td>Observed</td>
<td>2.0H:1V</td>
</tr>
<tr>
<td>Vegetation Establishment</td>
<td>ECTC Method #4 or ASTM D7322</td>
<td>200% min</td>
</tr>
<tr>
<td>Cover Factor</td>
<td>ASTM D6459</td>
<td>C ≤ 0.05</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>ASTM D6818</td>
<td>75 lb/ft</td>
</tr>
<tr>
<td>Shear Stress</td>
<td>ASTM D6460</td>
<td>≥ 1.75 lb/ft²</td>
</tr>
</tbody>
</table>

Photos Courtesy of East Coast Erosion Control
# Rolled Erosion Control Products (RECPs)

## Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May Be Supplemented with Degradable Infill Components</td>
<td>Observed</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Physical</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum Thickness</td>
<td>ASTM 6525</td>
<td>0.25 in</td>
<td>0.25 in</td>
<td>0.25 in</td>
</tr>
<tr>
<td>Vegetation Establishment</td>
<td>ECTC Method #4 or ASTM D7322</td>
<td>200% min</td>
<td>200% min</td>
<td>200% min</td>
</tr>
<tr>
<td>UV Resistance</td>
<td>ASTM D4355</td>
<td>80% @ 1000 hrs</td>
<td>80% @ 1000 hrs</td>
<td>80% @ 1000 hrs</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>ASTM D6818</td>
<td>145 X 110 lb/ft</td>
<td>170 X 130 lb/ft</td>
<td>1,400 x 1,100 lb/ft</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Slope Application</td>
<td>Observed</td>
<td>2.0H:1V</td>
<td>1.5H:1V</td>
<td>1.0H:1V</td>
</tr>
<tr>
<td>Shear Stress</td>
<td>ASTM D 6460</td>
<td>≥ 4.0</td>
<td>≥ 8.0</td>
<td>≥ 12.0</td>
</tr>
</tbody>
</table>

Photos Courtesy of North American Green
Silt Fence Systems

+ 2 Silt Fence Systems
  + Geotextile Filter Fabric and Steel Post System
  + Belted Silt Retention and Wood Post System
## Performance Requirement

### Minimum Filter Fabric Performance and Physical Requirements

<table>
<thead>
<tr>
<th>Physical Property *</th>
<th>Test Method</th>
<th>Required Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filtering Efficiency Performance</td>
<td>ASTM D 5141 or Equivalent</td>
<td>80% Total Suspended Solids (TSS)</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>ASTM D 4632</td>
<td>90 lbs</td>
</tr>
<tr>
<td>Ultraviolet Stability (retained strength after 500 hrs of ultraviolet exposure)</td>
<td>ASTM D 4365</td>
<td>70%</td>
</tr>
</tbody>
</table>

* Unless otherwise indicated, numerical values represent the MARV.
Sediment Tubes

+ Temporary erosion control BMP used along contours on slopes, as perimeter control, in drainage conveyance swales, and around inlets to help reduce the effects of soil erosion and to retain sediment.

+ Made of straw, coconut, excelsior, geotextiles, washed recycled rubber, compost, wood mulch, recycled carpet.
Sediment Tubes

Photos Courtesy of Filtrrexx, GeoHay, East Cost Erosion
## Sediment Tubes

### Minimum Performance Requirements for Sediment Tubes

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Installed Tube Diameter</td>
<td>Field Measured</td>
<td>18.0-in minimum 24.0-in maximum</td>
</tr>
<tr>
<td>Mass per Unit Length</td>
<td>Field Measured</td>
<td>3.0 lbs/ft ±10% minimum for 18-in diameter, 4.0 lbs/ft ±10% minimum for 24-in diameter</td>
</tr>
<tr>
<td>Length per Tube</td>
<td>Field Measured</td>
<td>10-ft minimum*</td>
</tr>
<tr>
<td>Tube Filtering Efficiency Performance</td>
<td>ASTM D 5141 or ASTM D 7351</td>
<td>80% Total Suspended Solids (TSS)</td>
</tr>
<tr>
<td>Netting UV Stability (retained strength after 500 hours)</td>
<td>ASTM 4355</td>
<td>70%</td>
</tr>
</tbody>
</table>

*Select a length to minimize the number of sediment tubes needed. If the ditch check or inlet length (perpendicular to the water flow) is 15 feet, then one 15-foot sediment tube is preferred over two overlapped 10-foot sediment tubes.
Compost

- Product resulting from the controlled biological decomposition of organic material occurring under aerobic conditions that has been sanitized through the generation of heat and stabilized.

- Do not use materials that have been treated with chemical preservatives as a compost feedstock.
Compost

+ Provide compost from compost producer that participates in United States Composting Council’s (USCC) Seal of Testing Assurance (STA) program. The Department will accept only STA approved compost.

+ Compost feedstock may include, but is not limited to, the following:
  + Leaf and yard trimmings
  + Food scraps
  + Treated biosolids
  + Manure
  + Agricultural residuals
  + Forest residuals
  + Tree wood
  + Bark
  + Paper
Inlet Structure Filters

- Inlet Structures Filters Types A, B, D, E, F and G
  - Type A Low Flow Inlet Filters
    - peak flow rates < 1 ft³/sec
  - Type B Medium Flow, Low Velocity Inlet Filters
    - peak flow rates < 3 ft³/sec
  - Type D High Flow, High Velocity Inlet Filters
    - drainage area < 2 acres, peak flow may be > 3 ft³/sec
  - Type E- Surface Course Curb Inlet Filters
    - Install after the road surface course is placed
  - Type F -Inlet Tubes
    - Can be weighted and non weighted
    - drainage areas < 1 acre
  - Type G -Suspended Internal Inlet Filters
    - drainage areas < 1 acre and peak flow < 3ft³/sec
Inlet Structure Filters

+ Type A Low Flow Inlet Filters

+ Type B Medium Flow, Low Velocity Inlet Filters

Photos Courtesy of GeoHay
Inlet Structure Filters

+ Type D High Flow, High Velocity Inlet Filters

+ Type E- Surface Course Curb Inlet Filters
Inlet Structure Filters

+ Type F - Inlet Tubes

[Images of weighted and non-weighted inlet tubes]

+ Type G - Suspended Internal Inlet Filters

[Images of suspended internal inlet filters]

Photos Courtesy of ACF Environmental and Flexstorm
## Minimum Performance Requirements for Inlet Filters

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filtering Efficiency Performance</td>
<td>ASTM D5141 or ASTM D7351</td>
<td>80% Total Suspended Solids (TSS)</td>
</tr>
<tr>
<td>Clean Water Flow Rate</td>
<td>ASTM D4491</td>
<td>100 gal/min/ft² minimum</td>
</tr>
<tr>
<td>Tensile Strength Type A</td>
<td>ASTM D4632</td>
<td>90 lbs</td>
</tr>
<tr>
<td>Tensile Strength Type D, E</td>
<td>ASTM D4632</td>
<td>80 lbs</td>
</tr>
<tr>
<td>Tensile Strength Type G</td>
<td>ASTM D4632</td>
<td>250 lbs</td>
</tr>
<tr>
<td>Ultraviolet Stability (retained strength after 500 hrs)</td>
<td>ASTM D4355</td>
<td>70%</td>
</tr>
</tbody>
</table>
Check Dam Alternatives

Photos Courtesy of Triangular Silt Dike
Check Dam Alternatives

Photos Courtesy of Nilex GeoRidge
Dewatering Bags

Used for Dewatering and Turbidity Control

Photos Courtesy of ACF Environmental, Dirtbag
Transition Mats

+ Rip-Rap Outlet protection alternative

Photos Courtesy of ScourStop

Photos Courtesy of Presto Georunner
Turbidity Curtains

- Used when work is conducted in water body
Porous Baffle Sediment Traps/Basins

- Used for greater trapping efficiencies and for turbidity control

*Photo Courtesy NC State University*
Top Water Withdrawal Sediment Traps/Basins

+ Used for greater trapping efficiencies and for turbidity control
Coming soon..............Turbidity Standards!

Photos Courtesy Clemson University
Updates

- Look for Supplemental Specification updates at:
  http://www.scdot.org/doing/sup_tech_specs.shtml

- Look for QPL List at:
  http://www.scdot.org/doing/rm_lab.asp