



Use of Compost for Erosion Control: A Survey of State Practice

Prepared for
Bureau of Equity and Environmental Services

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WisDOT Research & Library Unit
September 17, 2009

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Request for Report

The June 2008 edition of the AASHTO Provisional Standards describes compost as “the 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 to the point that it is appropriate for its particular application.” State transportation agencies are using compost for erosion control on roadside projects as an alternative to conventional slope stabilization methods.

Compost applications take various forms to control erosion and retain sediment in disturbed areas, including:

- *Compost blanket.* A layer of loosely applied compost or composted material is placed on the soil.
- *Compost filter berm.* A dike of compost or a compost product, trapezoidal in cross section, is placed perpendicular to sheet-flow runoff.
- *Compost filter sock.* Essentially a contained compost filter berm, this tubular filtration device, oval to round in cross section and filled with composted material, is placed perpendicular to sheet-flow runoff.

The Bureau of Equity and Environmental Services is interested in learning about the practices of other states that use compost for erosion and storm water runoff control.

Summary

We conducted a brief survey of state DOT environmental contacts consisting of the following questions:

1. What are the allowable uses of compost in your state?
2. What testing protocols, standards or certification requirements apply to your agency’s use of compost?
3. Compost may be derived from a variety of feedstocks. Please indicate all that apply to the compost used by your agency.
4. What compost application methods are used by your agency?
5. Please describe application rates and any limitations (for example, soil characteristics, slope length and steepness, and flow drainage patterns) associated with field application of compost blankets, filter berms, filter socks, or other compost applications.
6. Is topsoil required for compost application?

7. Does your agency employ time-of-year restrictions for compost application?
8. Is the use of compost considered an equal alternative to other best management practices?
9. Have you encountered any challenges when using compost for erosion or storm water runoff control?
10. Please provide details on any of your answers, or additional comments.

Twenty state DOTs responded to the survey, with three state DOTs submitting two responses. See **Survey Results** beginning on page 3 of this report for the full text of these survey responses. State specifications provided by survey respondents are included in Appendices A through F.

Key findings from the survey follow. Percentages are based on the number of responses to each question.

Allowable Uses for Compost and Testing Protocols

- Most agencies (90 percent) use compost as a soil amendment. The next most common use of compost is for erosion control (75 percent). Other uses of compost include as a top dressing and for storm water runoff control (55 percent), and in place of topsoil (50 percent).
- More than half of the agencies conducting testing (56 percent) use the U.S. Composting Council's Seal of Testing Assurance (STA) Program. More than one-third (38 percent) employ the U.S. Composting Council's Test Methods for the Examination of Composting and Compost (TMECC), and one-quarter (25 percent) use the Solvita Compost Maturity Test.
- Other approaches to testing include permitting compost purchases from only EPA-approved compost facilities (Illinois and Ohio DOTs), visual inspection (Maine DOT), and adherence to EPA requirements (Rhode Island DOT and Vermont Agency of Transportation).
- Three states—Michigan, Montana and Oregon—are developing testing programs.

Compost Composition

- Most agencies (85 percent) use compost derived from yard waste. Washington State DOT noted a state law requiring that a minimum of 65 percent of the compost used in Washington come from yard waste. The remaining 35 percent can be composed of other organic feedstocks.
- Almost two-thirds of the agencies (65 percent) report using compost derived from tree wood, and more than half (55 percent) use compost derived from agricultural and forestry residual feedstocks.

Compost Application

- Almost three-quarters of the agencies (70 percent) use compost blankets and filter socks; almost two-thirds (60 percent) use filter berms.
- Respondents report the use of other compost applications, including compost incorporate (Caltrans), mulch when combined with binder additive (Illinois DOT), and compost-amended vegetated filter strip (Washington State DOT).
- More than three-quarters of the agencies (78 percent) do not require topsoil for compost application.
- Almost three-quarters (74 percent) do not employ time-of-year restrictions for compost applications. Agencies reporting time-of-year restrictions preclude compost applications during summer construction season, apply compost during the spring and fall, or coordinate compost applications with regular seeding and planting periods.
- More than two-thirds of the agencies (69 percent) consider the use of compost in at least some applications to be an equal alternative to other erosion control best management practices.

- Only three agencies do not consider the use of compost for erosion control an equal alternative to other BMPs. The remaining respondents indicated that more experience is required to consider placing compost on an equal footing with other BMPs.

Challenges When Using Compost for Erosion Control

- Challenges reported by respondents include:
 - Resistance to the use of compost on the part of the public and permitting agencies has been addressed by research projects commissioned by Caltrans. See the **California** entry in **Survey Results** for links to information about these projects.
 - Maine DOT reports that compost does not work well in concentrated flow or on slopes with groundwater weeps.
 - Difficulties ensuring an adequate supply of compost were noted by Michigan and Rhode Island DOTs.
 - Texas DOT indicates that proper inspection is vital to ensuring quality materials. Material not properly or adequately composted can contribute to water quality issues.
 - The importance of educating inspectors, designers and engineers was noted by Texas and Washington State DOTs.
- Only two agencies report no challenges in connection with their use of compost for erosion control.

Survey Results

The full text of each survey response is provided below. For reference, we have included an abbreviated version of each question before the response; for the full question text, please see the Summary on page 1 of this report.

Arizona

Contact: LeRoy Brady, Chief Landscape Architect, Roadway Design, Roadside Development, Arizona Department of Transportation.

1. **Allowable uses of compost:** As a soil amendment; as a top dressing; in place of topsoil.
2. **Testing protocols:** U.S. Composting Council's Test Methods for the Examination of Composting and Compost (TMECC); Solvita Compost Maturity Test. From the above we developed our own requirements that are less stringent than for agriculture but adequate for a soil amendment.
3. **Compost feedstocks:** Forestry residuals; tree wood; yard waste.
4. **Compost application methods:** Filter sock; soil amendment.
- 5a. **Application practices for compost blankets:** [No response.]
- 5b. **Application practices for filter berms:** [No response.]
- 5c. **Application practices for filter socks:** [No response.]
- 5d. **Application practices for other applications:** Soil amendment tilled in prior to seeding; rates are from 12 to 15 cubic yards per acre.
6. **Is topsoil required for compost application?** No.
7. **Are there time-of-year restrictions?** No.
8. **Is compost an equal alternative to other BMPs?** [No response.]
9. **Have you encountered any challenges?** Quality control and adequate composting.
10. **Details or comments:** With seeding, we also use low-water-soluble fertilizer blend with no hydro-application dry broadcasting and require that it be tilled and incorporated into the soil with the compost and soil sulfur.

Specifications:

Special Provisions, 805: Seeding; Item 8050003: Seeding (Class II), Arizona Department of Transportation, September 10, 2009.
See Appendix A.

California

Contact: Jack Broadbent, Supervising Landscape Architect, California Department of Transportation.

1. **Allowable uses of compost:** As a soil amendment; as a top dressing; for erosion control; for storm water runoff control; like a soil amendment but incorporated into the soil on erosion-control projects.
2. **Testing protocols:** U.S. Composting Council's Seal of Testing Assurance (STA) Program.
3. **Compost feedstocks:** Agricultural residuals; biosolids; composted manure; food residuals; forestry residuals; tree wood; yard waste.
4. **Compost application methods:** Compost blanket; filter sock; compost incorporate.
- 5a. **Application practices for compost blankets:** Soil characteristics: Sandy soil needing additional organics. Steepness: Applied on 2h:1v or flatter.
- 5b. **Application practices for filter berms:** N/A
- 5c. **Application practices for filter socks:** Used in place of fiber roll. Slope length = Typically 20 feet on center. Steepness = Maximum 1.5h to 1v or flatter.
- 5d. **Application practices for other applications:** Compost incorporate: A blanket of compost (4 to 6 inches) is applied to the slope, then incorporated into the soil to a depth of 6 to 24 inches depending on the site and what the project specifications require. Approximately about a 20 percent ratio to the native soil.
6. **Is topsoil required for compost application?** No.
7. **Are there time-of-year restrictions?** No.
8. **Is compost an equal alternative to other BMPs?** Compost is a tool in the tool box for erosion control and revegetation of the roadsides.
9. **Have you encountered any challenges?** Yes. There has been a lot of resistance to the use of compost. Many people and permit agencies have been fearful of allowing its use for a variety of reasons. Caltrans has commissioned several research projects to show the benefits of applying and using compost and dismiss any unfounded resistance. Here are links to some of the research:
Erosion Control and Stormwater Research
http://www.dot.ca.gov/hq/LandArch/research/erosion_control.htm

Soils Research
<http://www.dot.ca.gov/hq/LandArch/research/soils.htm>
10. **Details or comments:** We have been looking at better, more effective application methods. The Snow Blower looks promising as an application tool; see <http://www.dot.ca.gov/ctnews/feb06/snowplow.shtml>.

Specifications:

Caltrans Compost Specifications, California Department of Transportation Web site, undated
http://www.dot.ca.gov/hq/LandArch/policy/compost_specs.htm

Florida

Contact: Josh Boan, Environmental Manager, FDOT.

Note: *Responses to Questions 4 and 5b were taken from the State of Florida Erosion and Sediment Control Designer and Reviewer Manual provided by Florida DOT.*

1. **Allowable uses of compost:** As a soil amendment; as a top dressing; for erosion control.
2. **Testing protocols:** [No response.]
3. **Compost feedstocks:** [No response.]
4. **Compost application methods:** Filter berm.
- 5a. **Application practices for compost blankets:** [No response.]
- 5b. **Application practices for filter berms:** Minimum recommended grade of slope where berm is to be installed is 1 percent. Berms should be constructed with an ideal 1V:2H ratio to maintain stability.

- 5c. **Application practices for filter socks:** [No response.]
- 5d. **Application practices for other applications:** [No response.]
- 6. **Is topsoil required for compost application?** [No response.]
- 7. **Are there time-of-year restrictions?** [No response.]
- 8. **Is compost an equal alternative to other BMPs?** [No response.]
- 9. **Have you encountered any challenges?** [No response.]
- 10. **Details or comments:** [No response.]

Specifications:

State of Florida Erosion and Sediment Control Designer and Reviewer Manual, HydroDynamics Inc., University of Central Florida Stormwater Management Academy, June 2007
http://www.stormwater.ucf.edu/FLerosionSedimentManual_6_07.pdf.

Georgia

Contact: Brad Young, P.E., Materials & Research Branch Chief, Georgia Department of Transportation.

- 1. **Allowable uses of compost:** As a soil amendment; for erosion control.
- 2. **Testing protocols:** U.S. Composting Council's Seal of Testing Assurance (STA) Program; U.S. Composting Council's Test Methods for the Examination of Composting and Compost (TMECC); Solvita Compost Maturity Test.
- 3. **Compost feedstocks:** Agricultural residuals; biosolids; food residuals; forestry residuals; tree wood; yard waste.
- 4. **Compost application methods:** Compost blanket; filter berm; filter sock.
- 5a. **Application practices for compost blankets:** Max 2:1 slope; 2 inches thick.
- 5b. **Application practices for filter berms:** Uncompacted 1.5 ft to 2 ft high trapezoidal berm, which is approximately 2 ft to 3 ft wide at the top and minimum 4 ft wide at the base.
 - Slope < 2% = Max slope length above berm 75 ft
 - Slope 2 to 5% = Max slope length above berm 50 ft
 - Slope 5 to 10% = Max slope length above berm 35 ft
 - Slope 10 to 20% = Max slope length above berm 20 ft
 - Slope > 20% = Max slope length above berm 10 ft
- 5c. **Application practices for filter socks:** Circular bales at least 18" diameter.
 - Slope < 2% = Max slope length above berm 75 ft
 - Slope 2 to 5% = Max slope length above berm 50 ft
 - Slope 5 to 10% = Max slope length above berm 35 ft
 - Slope 10 to 20% = Max slope length above berm 20 ft
 - Slope > 20% = Max slope length above berm 10 ft
- 5d. **Application practices for other applications:** [No response.]
- 6. **Is topsoil required for compost application?** No.
- 7. **Are there time-of-year restrictions?** No.
- 8. **Is compost an equal alternative to other BMPs?** [No response.]
- 9. **Have you encountered any challenges?** Compost was approved in 2006 for use in erosion control applications. However, to date, no compost has been installed on GDOT projects for erosion control purposes. Contractors elect (due to cost and ease of installation) to use other BMPs.
- 10. **Details or comments:** Question 3: Use Class A biosolids. Mixed municipal solid waste compost and Class B biosolids are unacceptable.

Specifications:

Supplemental Specifications, Georgia Department of Transportation, 2008

<http://thesource.dot.ga.gov/contract/index.html>

Click the icon for “Supplemental Specifications Published in 2008 Edition,” then click on “893 – Miscellaneous Planting Materials.”

Shelf Special Provisions, Georgia Department of Transportation, 2009

<http://thesource.dot.ga.gov/contract/index.html>

Click the icon for “Shelf Special Provisions,” then click on “163 – Miscellaneous Erosion Control Items.”

Illinois

Contact: Matthew Sunderland, RLA, Landscape & Environmental Resource Specialist, Illinois Department of Transportation.

1. **Allowable uses of compost:** As a soil amendment; for erosion control; in place of topsoil. Can be used as mulch for seeding operations if combined with a performance additive designed to bind/stabilize. We allow this per our specs, but it has not been used in the five-plus years it has been allowed. I have checked erosion control above but wasn't sure if you were including mulch as erosion control.
2. **Testing protocols:** Must be purchased from an Illinois EPA-approved composting facility. District Landscape Architects inspect the facility to ensure compliance with specs and to get copy of IEPA certificate.
3. **Compost feedstocks:** Yard waste.
4. **Compost application methods:** Mulch when combined with binder additive.
- 5a. **Application practices for compost blankets:** [No response.]
- 5b. **Application practices for filter berms:** [No response.]
- 5c. **Application practices for filter socks:** [No response.]
- 5d. **Application practices for other applications:** Lack design guidance for this application.
6. **Is topsoil required for compost application?** No.
7. **Are there time-of-year restrictions?** No.
8. **Is compost an equal alternative to other BMPs?** Equal to the use of crimped straw as a mulch.
9. **Have you encountered any challenges?** Never been used.
10. **Details or comments:** [No response.]

Specifications:

Standard Specifications for Road and Bridge Construction, Division 200: Earthwork, Landscaping, and Erosion Control, Illinois Department of Transportation, January 1, 2007

<http://www.dot.il.gov/desenv/spec2007/div200.pdf>

See page 25 of the PDF for Section 211: Topsoil and Compost.

Indiana

Contact: Richard L. Phillabaum, Erosion Control Specialist, Indiana Department of Transportation.

1. **Allowable uses of compost:** As a soil amendment; for erosion control; for storm water runoff control; in place of topsoil.
2. **Testing protocols:** U.S. Composting Council's Seal of Testing Assurance (STA) Program.
3. **Compost feedstocks:** Agricultural residuals; biosolids; composted manure; food residuals; forestry residuals; tree wood; yard waste.

4. **Compost application methods:** Compost blanket; filter berm; filter sock.
- 5a. **Application practices for compost blankets:** 2.5" applied to the cover area with the last 0.5" applied with seed.
- 5b. **Application practices for filter berms:** 18" high berm with a 1" crown; should not be applied over aggregate; must have a good soil contact or berm will be undercut. Berms cannot withstand the pressure of ponding water behind them so slope drains must be used at key locations to prevent blowouts.
- 5c. **Application practices for filter socks:** 6-8" socks used as water diversions and ditch checks inside safety zones. Cannot withstand high velocity of concentrated water flow.
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** Yes.
7. **Are there time-of-year restrictions?** No.
8. **Is compost an equal alternative to other BMPs?** Yes, but caution should always be used so that you don't overextend its structural capabilities.
9. **Have you encountered any challenges?** Yes, weather is always a concern; multiple rain events over several days can cause soils to become saturated. Compost soil blanket tends to retain a high volume of water that can contribute to slides forming on 3:1 slopes or greater.
10. **Details or comments:** [No response.]

Specifications:

Compost Filter Berm, Indiana Department of Transportation, undated
Compost Filter Sock, Indiana Department of Transportation, undated
Compost Filter Sock (water permeable), Indiana Department of Transportation, undated
Compost Soil Blanket, Indiana Department of Transportation, October 1, 2002
 See [Appendix B](#).

Kansas

Contact: Scott Shields, Environmental Scientist, KDOT Environmental Services Section.

1. **Allowable uses of compost:** As a soil amendment; as a top dressing; for erosion control; for storm water runoff control. We have experimented with compost for erosion control but not cost effective.
2. **Testing protocols:** U.S. Composting Council's Seal of Testing Assurance (STA) Program; Solvita Compost Maturity Test.
3. **Compost feedstocks:** Agricultural residuals; composted manure; food residuals; forestry residuals; tree wood; yard waste.
4. **Compost application methods:** Filter berm; filter sock.
- 5a. **Application practices for compost blankets:** [No response.]
- 5b. **Application practices for filter berms:** Experimental.
- 5c. **Application practices for filter socks:** Experimental.
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** No.
7. **Are there time-of-year restrictions?** No.
8. **Is compost an equal alternative to other BMPs?** Depends on the situation.
9. **Have you encountered any challenges?** Feasibility; not having compost close to project site.
10. **Details or comments:** [No response.]

Specifications:

None.

Maine

Contact: Michael Clark, Compliance Coordinator, MaineDOT.

1. **Allowable uses of compost:** As a soil amendment; as a top dressing; for erosion control; for storm water runoff control; in place of topsoil. We use what we call Erosion Control Mix for containment berms in lieu of silt fence. The ECM is essentially a mixture of wood processing by-products: bark, woody debris, soil and rock. It is not a true compost by definition but it works extremely well, especially when it has aged a bit before use.
2. **Testing protocols:** See specification. Usually just a visual inspection is required.
3. **Compost feedstocks:** Forestry residuals; tree wood; yard waste.
4. **Compost application methods:** Compost blanket; filter berm; filter sock.
- 5a. **Application practices for compost blankets:** Minimum of 4" in depth and 100 percent coverage.
- 5b. **Application practices for filter berms:** 24" wide at the base and minimum of 12" in height.
- 5c. **Application practices for filter socks:** Supplier recommendation.
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** No.
7. **Are there time-of-year restrictions?** No.
8. **Is compost an equal alternative to other BMPs?** Preferred to silt fence for sediment control; accepted as permanent slope stabilization as soon as it is applied to specification.
9. **Have you encountered any challenges?** Does not work well in concentrated flow or on slopes with groundwater weeps.
10. **Details or comments:** Again, our use of compost is pretty much limited to wood waste products.

Specifications:

Special Provisions, Section 617: Erosion Control Mix, Maine Department of Transportation, June 20, 2002

See [Appendix C](#).

Maryland

Contact: Donald B. Cober, Technical Resource Specialist, Maryland State Highway Administration.

1. **Allowable uses of compost:** As a soil amendment; in place of topsoil.
2. **Testing protocols:** U.S. Composting Council's Test Methods for the Examination of Composting and Compost (TMECC).
3. **Compost feedstocks:** Agricultural residuals; biosolids; yard waste.
4. **Compost application methods:** Compost blanket; filter berm; filter sock.
- 5a. **Application practices for compost blankets:** Placed on topsoil after nutrient management plan was implemented. Blanket = 2 inches deep. On slopes steeper than 3:1, turf reinforcement netting is stapled down first and compost-filled tubes (filter socks) are placed at the top of the slope and every 30 feet down the slope as needed. These are placed before the seed blanket.
- 5b. **Application practices for filter berms:** These berms were placed on a flat area adjacent above the road to prevent silt from coming down the slope into a ditch.
- 5c. **Application practices for filter socks:** Compost max particle size = 2 inches. Mesh tube = photodegradable HDPE [high-density polyethylene], 5 mil thickness. Stakes 3 ft in height, placed every 5 ft on center on 2:1 slopes, 10 ft on center for 3:1 slopes, and 20 ft on center for flatter slopes.
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** No.
7. **Are there time-of-year restrictions?** No.
8. **Is compost an equal alternative to other BMPs?** Can be when there is no topsoil available.
9. **Have you encountered any challenges?** No.

10. **Details or comments:** [No response.]

Specifications:

Standard Specifications for Construction and Materials, Section 920: Landscaping; Section 920.02: Soil Amendments, Maryland Department of Transportation, July 2008

See [Appendix D](#).

Michigan

Contact: Judy Ruskowski, Operations Environmental Engineer, Michigan DOT.

1. **Allowable uses of compost:** As a soil amendment; as a top dressing; for erosion control; for storm water runoff control; in place of topsoil. In geo-wrapped socks and bales, although this is a new product for us in the erosion and sedimentation control mix. Right now we are doing pilot programs. We are very interested to hear the outcome of this survey, too, as it could help in expanding our use.
2. **Testing protocols:** We are currently investigating reliance on the U.S. Composting Council STA program. Also MSU [Michigan State University] may reinstate a testing program for compost that MDOT could rely on. Either way, we need to establish a qualification process (Qualified Product List) before we can expand the use.
3. **Compost feedstocks:** Yard waste. Michigan is currently working on a rules package under the Solid Waste Rules that will expand compost beyond yard waste. All the waste streams listed, with the exception of biosolids, are being considered.
4. **Compost application methods:** Compost blanket; filter berm; filter sock. Also using topsoil/compost blends. Many are in pilot stage for MDOT right now but we anticipate expanding.
- 5a. **Application practices for compost blankets:** [No response.]
- 5b. **Application practices for filter berms:** [No response.]
- 5c. **Application practices for filter socks:** [No response.]
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** Yes.
7. **Are there time-of-year restrictions?** Yes. Restrictions generally coincide with seeding and planting restrictions per our standard specifications.
8. **Is compost an equal alternative to other BMPs?** Not yet.
9. **Have you encountered any challenges?** Right now the primary challenge is establishing a QA process and ensuring a source of supply when projects come on line.
10. **Details or comments:** Our special provisions are in a state of flux right now but could be provided later this year. Feel free to send a reminder e-mail. MDOT would very much like to see the outcome of this survey if that is possible.

Specifications:

None at this time. Special provisions could be available later in 2009.

Montana

Contact: Phil Johnson, Reclamation Specialist, Montana Department of Transportation.

1. **Allowable uses of compost:** As a soil amendment; as a top dressing; in place of topsoil. Incorporating compost with our hydromulch blend has been shown to accelerate seed germination and stand establishment. It's also used to ameliorate soils with high soluble salt levels.
2. **Testing protocols:** We are just now at the stage of requiring testing of compost to comply with physical/chemical properties. Previously, the compost was "source approved." We will likely employ a combination of protocols/standards developed by the TMECC.

3. **Compost feedstocks:** Agricultural residuals; biosolids; composted manure; forestry residuals. Our feedstocks are typically composed of municipal biosolids and wood waste.
4. **Compost application methods:** Compost blanket. It can be applied by blower truck as a stand-alone mulch or blended with standard hydromulch products and applied hydraulically.
- 5a. **Application practices for compost blankets:** If compost is applied as a stand-alone mulch, we typically apply amounts equal to 1/4 to 1/2 inch depths. We often times overspray the blanket with a plant-based tackifier. On critical sites or where wind/water erosion is expected, we will cover the compost with a light erosion control blanket.
- 5b. **Application practices for filter berms:** [No response.]
- 5c. **Application practices for filter socks:** [No response.]
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** No.
7. **Are there time-of-year restrictions?** Yes. Exceptions can be made, but compost is almost always applied in conjunction with our regular spring and fall-dormant seeding periods.
8. **Is compost an equal alternative to other BMPs?** No. It's used to accompany other BMPs.
9. **Have you encountered any challenges?** Effectiveness can be compromised by wind and water displacing the compost from its application site.
10. **Details or comments:** [No response.]

Specifications:

Proposed Montana Department of Transportation Compost Specifications, Montana Department of Transportation, undated
See [Appendix E](#).

Montana

Contact: Benjamin Dean, Civil Engineering Specialist, Montana Department of Transportation.

1. **Allowable uses of compost:** As a soil amendment; as a top dressing.
2. **Testing protocols:** [No response.]
3. **Compost feedstocks:** [No response.]
4. **Compost application methods:** [No response.]
- 5a. **Application practices for compost blankets:** [No response.]
- 5b. **Application practices for filter berms:** [No response.]
- 5c. **Application practices for filter socks:** [No response.]
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** [No response.]
7. **Are there time-of-year restrictions?** [No response.]
8. **Is compost an equal alternative to other BMPs?** [No response.]
9. **Have you encountered any challenges?** [No response.]
10. **Details or comments:** Soil amendments and use of compost is dependent on the soil conditions in the area. Montana has such a varied climate and soil conditions that our agronomist determines if a soil amendment or compost and the use and type of the amendment or compost is required on a project basis.

Specifications:

Proposed Montana Department of Transportation Compost Specifications, Montana Department of Transportation, undated
See [Appendix E](#).

North Carolina

Contact: Ted Sherrod, PE, CPESC, CPSWQ, Transportation Engineering Manager, NCDOT.

1. **Allowable uses of compost:** For erosion control; for storm water runoff control; in place of topsoil; as a method of seeding (compost blanket).
2. **Testing protocols:** U.S. Composting Council's Seal of Testing Assurance (STA) Program.
3. **Compost feedstocks:** Agricultural residuals; biosolids; composted manure; food residuals; forestry residuals; industrial residuals; tree wood; yard waste.
4. **Compost application methods:** Compost blanket. Primarily compost blanket; filter berm and filter sock on very limited basis.
- 5a. **Application practices for compost blankets:** Have researched and spec'd 0.5, 1, and 2 inches. One inch appears most economical for turf establishment, very expensive but comparable to conventional seeding and temporary matting (temp ECB) [temporary erosion control blanket].
- 5b. **Application practices for filter berms:** Considering incorporating EPA's spec for 18" berm height on site perimeter near jurisdictional areas.
- 5c. **Application practices for filter socks:** Primarily spec excelsior socks and use as fiber check dams in swales; tougher to transport 10' compost socks to install into swales.
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** No.
7. **Are there time-of-year restrictions?** No.
8. **Is compost an equal alternative to other BMPs?** No. Compost blankets are used when soil conditions are not conducive for seed germination and establishment. Examples include coastal North Carolina, where dredge spoils are used for roadway embankments. Compost blanket is considered equal to seeding and matting a slope with a temporary ECB.
9. **Have you encountered any challenges?** Have used ground clearing and grubbing debris as temporary groundcover and has worked satisfactorily for erosion control.
10. **Details or comments:** You may call to discuss at (919) 733-2920.

Specifications:

Compost Blanket, North Carolina Department of Transportation, undated

See [Appendix F](#).

Ohio

Contact: Robert Lang, Storm Water Management Program Coordinator, Ohio Department of Transportation.

1. **Allowable uses of compost:** As a soil amendment; as a top dressing; for erosion control; for storm water runoff control; in place of topsoil.
2. **Testing protocols:** [No response.]
3. **Compost feedstocks:** [No response.]
4. **Compost application methods:** [No response.]
- 5a. **Application practices for compost blankets:** [No response.]
- 5b. **Application practices for filter berms:** [No response.]
- 5c. **Application practices for filter socks:** [No response.]
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** [No response.]
7. **Are there time-of-year restrictions?** [No response.]
8. **Is compost an equal alternative to other BMPs?** [No response.]
9. **Have you encountered any challenges?** [No response.]
10. **Details or comments:** For Question 1, use of all these items are "allowable" in Ohio since there is no regulation prohibiting their use. With regard to specifications, Ohio DOT only specs use of compost in

seeding and mulching (not erosion or storm water runoff control).

Specifications:

None.

Ohio

Contact: Ron Trivisonno, Transportation Engineer 4, Ohio Department of Transportation.

1. **Allowable uses of compost:** As a soil amendment; as a top dressing; landscape mulch.
2. **Testing protocols:** Supply material from an OEPA-permitted source.
3. **Compost feedstocks:** Tree wood; yard waste; ag[ricultural residuals] and bio[solids] may be allowed by plan note.
4. **Compost application methods:** Compost blanket.
- 5a. **Application practices for compost blankets:** [No response.]
- 5b. **Application practices for filter berms:** [No response.]
- 5c. **Application practices for filter socks:** [No response.]
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** Yes.
7. **Are there time-of-year restrictions?** No.
8. **Is compost an equal alternative to other BMPs?** [No response.]
9. **Have you encountered any challenges?** [No response.]
10. **Details or comments:** [No response.]

Specifications:

Construction and Material Specifications, Section 650: Roadsides; Item 659: Seeding and Mulching,
Ohio Department of Transportation, 2008

<http://www.dot.state.oh.us/Divisions/ConstructionMgt/Specifications/2008CMS/600/659.htm>

Oregon

Contact: Raghu P.V. Namburi, Erosion and Landscape Program Manager, Oregon Department of Transportation.

1. **Allowable uses of compost:** As a top dressing; for erosion control; for storm water runoff control.
2. **Testing protocols:** None. We are in the process of developing compost specifications with STA testing requirement.
3. **Compost feedstocks:** Composted manure; tree wood; yard waste.
4. **Compost application methods:** Compost blanket; filter berm; filter sock.
- 5a. **Application practices for compost blankets:** In draft.
- 5b. **Application practices for filter berms:** In draft.
- 5c. **Application practices for filter socks:** In draft.
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** No.
7. **Are there time-of-year restrictions?** No.
8. **Is compost an equal alternative to other BMPs?** For erosion and sediment control purposes, we consider compost an equal alternative to other BMPs.

9. **Have you encountered any challenges?** No, we have had better luck with compost as an erosion and sediment control BMP.
10. **Details or comments:** Ron Alexander guided us through the process. [See <http://www.alexassoc.net/>.]

Specifications:

Special provisions are under review; ODOT can provide the specifications after they are approved.

Pennsylvania

Contact: Daniel E. Snowden, D.Ed., Environmental Planner/Strategic Recycling Program Manager, Pennsylvania Department of Transportation.

1. **Allowable uses of compost:** As a soil amendment; for erosion control; for storm water runoff control. Other uses include mulch and mulch binder (biosolids, recycled cellulose fiber/wood mixtures, wood fiber, spent mushroom compost); bonded fiber matrix (wood fiber).
2. **Testing protocols:** U.S. Composting Council's Seal of Testing Assurance (STA) Program; U.S. Composting Council's Test Methods for the Examination of Composting and Compost (TMECC); AASHTO MP-9 (Filter Berms); AASHTO MP-10 (Compost Blankets).
3. **Compost feedstocks:** Agricultural residuals; biosolids; food residuals; forestry residuals; industrial residuals; tree wood; yard waste.
4. **Compost application methods:** Compost blanket; filter berm; filter sock.
- 5a. **Application practices for compost blankets:** Application rate for seeded surfaces: Up to a 1:2 (2:1) slope, 510 cubic meters/hectare (270 cubic yards/acre), or 50 mm (2 inches) depth with +/- 12.6 mm (1/2 inch) tolerance. For unseeded surfaces: Up to 1:2 (2:1) slope, 1,020 cubic meters/hectare (540 cubic yards/acre) or 100 mm (4 inches) depth with +/- 12.6 mm (1/2 inch) tolerance.
- 5b. **Application practices for filter berms:** Construction rate: 1 kg/3 m (2.25 pounds per 10 linear feet) of berm. Trapezoidal shape, 600 mm high by 1,200 mm wide (2 feet high by 4 feet wide) with 1:2 (2:1) side slopes.
- 5c. **Application practices for filter socks:** Installation: Inject compost into a high-density polyethylene (HDPE) expandable, tubular, biodegradable or photodegradable, 3 mm to 5 mm (3/8 inch) knitted mesh netting fabric sock of 300 mm (12 inches) and 450 mm (18 inches) diameter. Fill sock with approved compost at a rate of 0.45 kg per 3 m (1 pound per 10 linear feet) and place so that sock serves as a physical barrier to intercept water flow. Minimal overlap of 300 mm (12 inches) on either side of the area to be protected; anchor sock with stakes or other approved devices, and be sure that sock is placed at least 1.5 meters (5 feet) from the toe of a slope where installed, if possible, and be sure that the ends of the sock are placed at a higher elevation than the overall sock body.
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** No.
7. **Are there time-of-year restrictions?** Yes. Although not official, most compost applications take place during the spring and fall months of the calendar year.
8. **Is compost an equal alternative to other BMPs?** We have not used compost products extensively enough as yet to make a definitive BMP comparison to other erosion and sedimentation control alternatives.
9. **Have you encountered any challenges?** One compost filter blanket project planned for our District 8-0 area had to be canceled because of a sinkhole in the area where the filter blanket was to be installed.
10. **Details or comments:** [No response.]

Specifications:

PennDOT Specifications Manual, Publication 408, Pennsylvania Department of Transportation:

Section 805: Mulching, 2000

<ftp://ftp.dot.state.pa.us/public/Bureaus/design/Pub408/Change9/Pub408Change9/Section800/Section805.pdf>

See Section 805.2: Material.

Section 808: Plants, Plantings, Transplanting, 2000

<ftp://ftp.dot.state.pa.us/public/Bureaus/design/Pub408/Change9/Pub408Change9/Section800/Section808.pdf>

See Section 808.2: Material.

Section 866, Compost Filtersock, undated

<ftp://ftp.dot.state.pa.us/public/bureaus/design/pub408/Pub4082007IE/Sections/866.pdf>

Section 867: Compost Blanket and Compost Filter Berm, undated

<ftp://ftp.dot.state.pa.us/public/bureaus/design/pub408/Pub4082007IE/Sections/867.pdf>

Strategic Recycling Program Fact Sheet, PennDOT District 6-0 Spent Mushroom Substrate Compost Embankment Project, FY2006

<ftp://ftp.dot.state.pa.us/public/Bureaus/design/SEMP/FACTS/SMSCompost.pdf>

Rhode Island

Contact: Mike Dahlquist, Environmental Scientist, Rhode Island Department of Transportation.

1. **Allowable uses of compost:** As a soil amendment; for erosion control.
2. **Testing protocols:** The RI Dept. of Environmental Management has regulations for compost and composting facilities (Solid Waste Regulation 1-8 online at www.dem.ri.gov). [See **Specifications** below.] Filter sock compost parameters follow EPA guidance.
3. **Compost feedstocks:** Yard waste.
4. **Compost application methods:** Filter sock; compost is used as a soil amendment for plantable soil. RIDOT has standard specifications for compost (M.18.03, page M-97). [See **Specifications** below.] Utilization has usually been through contract special provision.
- 5a. **Application practices for compost blankets:** [No response.]
- 5b. **Application practices for filter berms:** [No response.]
- 5c. **Application practices for filter socks:** These are a new BMP for RI. We are still developing a spec for this product and are primarily utilizing info from EPA as a starting point for our spec.
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** [No response.]
7. **Are there time-of-year restrictions?** Yes. As a soil amendment it can be utilized within the same timelines as plantable soil (within allowable growing season).
8. **Is compost an equal alternative to other BMPs?** As a soil amendment, yes. Filter socks are a new BMP with little history for RIDOT. The specs for filter socks consider them equal to other BMPs.
9. **Have you encountered any challenges?** As a soil amendment, availability can be an issue due to volume needed and time of season. Filter socks have not been used enough to have an opinion on challenges yet.
10. **Details or comments:** See <http://www.dot.state.ri.us/engineering/standards/index.asp>. This link should bring you to the RIDOT standard specs and our approved products listing. I will attempt to get a copy of our contract special provisions for compost use as a soil amendment. When the filter sock spec is complete I could send that to you as well. If you have questions, please do not hesitate to contact me.

Specifications:

Rules and Regulations for Composting Facilities and Solid Waste Management Facilities, State of Rhode Island and Providence Plantations, Department of Environmental Management Office of Waste Management, October 2005

http://www.dem.ri.gov/pubs/regs/regs/waste/swrg05_1.pdf

Standard Specifications for Road and Bridge Construction, Rhode Island Department of Transportation, 2004

<http://www.dot.state.ri.us/documents/engineering/BlueBook/CD-Bluebook.pdf>

See page 736 of the PDF for M.18.03: Compost.

Texas

Contact: Barrie Cogburn, Director, Landscape Design and Enhancement Section, TxDOT Design Division.

1. **Allowable uses of compost:** As a soil amendment; as a top dressing; for erosion control; for storm water runoff control; in place of topsoil.
2. **Testing protocols:** U.S. Composting Council's Seal of Testing Assurance (STA) Program; U.S. Composting Council's Test Methods for the Examination of Composting and Compost (TMECC).
3. **Compost feedstocks:** Agricultural residuals; biosolids; composted manure; food residuals; forestry residuals; tree wood; yard waste.
4. **Compost application methods:** Compost blanket; filter berm; filter sock; compost-manufactured topsoil to aid in quicker revegetation.
- 5a. **Application practices for compost blankets:** Erosion Control Compost is a blend of 1/2 compost and 1/2 wood chips, usually 2" deep. Slope applications can be 3:1 or greater.
- 5b. **Application practices for filter berms:** Limited to lower-velocity ditches.
- 5c. **Application practices for filter socks:** No limitations.
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** No.
7. **Are there time-of-year restrictions?** No.
8. **Is compost an equal alternative to other BMPs?** Yes. Erosion Control Compost as described above is used as an alternative to soil retention blankets (which add no nutrients to poor quality soil).
9. **Have you encountered any challenges?** Proper inspection is vital to ensuring quality materials. Material not properly or adequately composted can add to water quality issues. STA program affiliation has helped this greatly. Training to educate inspectors and designers about the proper placement—not adjacent to streams or other bodies of water where runoff could be an issue, etc.
10. **Details or comments:** Happy to help—we've specified over 400,000 CY this year, we love it!

Specifications:

Standard Specification, Item 161: Compost, Texas Department of Transportation, 2004

<ftp://ftp.dot.state.tx.us/pub/txdot-info/cmd/cserve/specs/2004/standard/s161.pdf>

Special Provisions, Item 161: Compost, Texas Department of Transportation, 2004

<http://www.dot.state.tx.us/apps/specs/ShowAll.asp?year=3&type=SP&number=161>

See the URL above for links to Special Provisions 161-001, 161-002, 161-003, 161-004 and 161-005.

Vermont

Contact: Andrea Wright, Construction Environmental Engineer, Vermont Agency of Transportation.

1. **Allowable uses of compost:** As a soil amendment; for storm water runoff control. Filtrexx Compost Soxx: We are looking to experiment with use in place of topsoil or combined with topsoil as a top dressing, which we feel will give us erosion control.
2. **Testing protocols:** Shall comply with EPA requirements for compost.
3. **Compost feedstocks:** We do not have a specified source so the materials we get can have a mix of all the above. It is most often from a composting facility that uses all of the above.
4. **Compost application methods:** Filter berm; filter sock.
- 5a. **Application practices for compost blankets:** [No response.]
- 5b. **Application practices for filter berms:** [No response.]
- 5c. **Application practices for filter socks:** [No response.]
- 5d. **Application practices for other applications:** We use manufacturer's recommendations. We do not have our own specs.
6. **Is topsoil required for compost application?** No.
7. **Are there time-of-year restrictions?** No.
8. **Is compost an equal alternative to other BMPs?** Erosion logs.
9. **Have you encountered any challenges?** [No response.]
10. **Details or comments:** I am interested to see the results of this survey.

Specifications:

None.

Washington

Contact: Sandy Salisbury, HQ Region Liaison Landscape Architect, Washington State Department of Transportation.

1. **Allowable uses of compost:** As a soil amendment; as a top dressing; for erosion control; for storm water runoff control; in place of topsoil.
2. **Testing protocols:** U.S. Composting Council's Seal of Testing Assurance (STA) Program; U.S. Composting Council's Test Methods for the Examination of Composting and Compost (TMECC); Solvita Compost Maturity Test.
3. **Compost feedstocks:** Biosolids; food residuals; tree wood; yard waste. We are required by state law to have a minimum of 65 percent of our compost come from yard waste. All other components can make up the remaining 35 percent.
4. **Compost application methods:** Compost blanket; filter berm; filter sock; compost-amended vegetated filter strip (CAVFS).
- 5a. **Application practices for compost blankets:** 3" depth on slopes that are generally 3:1 or flatter.
- 5b. **Application practices for filter berms:** Compost berms must be a minimum of 1 ft in height.
- 5c. **Application practices for filter socks:** Varying diameters.
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** No.
7. **Are there time-of-year restrictions?** No.
8. **Is compost an equal alternative to other BMPs?** It depends on the situation, but we are moving toward more compost use in linear features and away from ponds.
9. **Have you encountered any challenges?** It takes education to let designers know these methods can be used and that they work. Many engineers don't like to use compost because it can be messy and it changes as it sits—it's not concrete.
10. **Details or comments:** Consider the multiple benefits of compost. When used for erosion control, it can

be left on site—no removal costs—it benefits plant growth, so plants establish at a faster rate and provide permanent erosion control faster. Compost cleans storm water and it absorbs it, so loading is less because there is less runoff. We are also part of a recycling loop when we use compost. In addition, we are sequestering carbon in the soil when we incorporate compost. I have several examples of compost and no compost comparisons.

Specifications:

Standard Specifications for Road, Bridge, and Municipal Construction, Section 9-14: Erosion Control and Roadside Planting, Washington State Department of Transportation, August 3, 2009

<http://www.wsdot.wa.gov/publications/fulltext/projectdev/gspspdf/14ap9.pdf>

Washington

Contact: Mark Maurer, Highway Runoff Program Manager, Washington State Department of Transportation.

1. **Allowable uses of compost:** As a soil amendment; as a top dressing; for erosion control; for storm water runoff control; in place of topsoil.
2. **Testing protocols:** U.S. Composting Council's Seal of Testing Assurance (STA) Program; U.S. Composting Council's Test Methods for the Examination of Composting and Compost (TMECC); Solvita Compost Maturity Test.
3. **Compost feedstocks:** Agricultural residuals; biosolids; composted manure; food residuals; forestry residuals; tree wood; yard waste. Compost is required to be yard waste, but up to 35 percent can be from other organic feedstocks (usually those I checked).
4. **Compost application methods:** Compost blanket; filter berm; filter sock; a blanket that is incorporated into the soil.
- 5a. **Application practices for compost blankets:** 3" thick blanket (normally). We do prescribe blanket thickness based on soil properties, usually C:N [carbon-to-nitrogen] ratios, on some projects.
- 5b. **Application practices for filter berms:** 1' tall by 2' wide.
- 5c. **Application practices for filter socks:** 8" minimum.
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** No.
7. **Are there time-of-year restrictions?** Yes. Compost to be incorporated cannot be applied or incorporated when the ground is frozen or saturated.
8. **Is compost an equal alternative to other BMPs?** Yes, a compost blanket is an erosion control BMP. Berms and socks can replace silt fences.
9. **Have you encountered any challenges?** We have had to do monitoring to show that compost does accomplish erosion control and flow reductions.
10. **Details or comments:** For the compost specification go to Division 9-14.

Specifications:

Standard Specifications for Road, Bridge, and Municipal Construction, Section 9-14: Erosion Control and Roadside Planting, Washington State Department of Transportation, August 3, 2009

<http://www.wsdot.wa.gov/publications/fulltext/projectdev/gspspdf/14ap9.pdf>

Wyoming

Contact: John F. Samson, Agronomist, Wyoming Department of Transportation.

1. **Allowable uses of compost:** As a soil amendment; for erosion control.
2. **Testing protocols:** U.S. Composting Council's Seal of Testing Assurance (STA) Program; standard specifications.

3. **Compost feedstocks:** Agricultural residuals; composted manure; forestry residuals; tree wood; yard waste.
4. **Compost application methods:** Compost blanket.
- 5a. **Application practices for compost blankets:** 1.5 inches maximum depth, 1v:2h maximum.
- 5b. **Application practices for filter berms:** N/A
- 5c. **Application practices for filter socks:** N/A
- 5d. **Application practices for other applications:** [No response.]
6. **Is topsoil required for compost application?** Yes.
7. **Are there time-of-year restrictions?** Yes. Compost blankets not allowed 6/15 through 9/1 (summer construction); no restriction as soil amendment beyond frozen soils.
8. **Is compost an equal alternative to other BMPs?** No, especially compared to structural BMPs.
9. **Have you encountered any challenges?** Yes. Nitrogen unavailability on decomposed granite when using compost blanket (wood waste-based compost); high elevation site.
10. **Details or comments:** [No response.]

Specifications:

None.

COMPOST FILTER BERM

Quality Assurance. A proof of certification as a compost filter berm supplier shall be submitted to the Engineer for approval prior to installation. Test results for compost filter berm performance shall be made available upon request.

Submittals. The Contractor shall submit a drawing depicting the staging of the application of the filter berm.

Materials.

- (a) Compost Filter Berm. The compost filter berm material consists of a blend of compost and mulch materials according to the particle sizing specifications as follows:
1. Particle Size-Using the dry weight method, a minimum 99% passing 1" sieve and not more than 50% passing the 1/4" sieve. 98% of the material shall not exceed 3 inches in length. The objective of the above parameters is to provide a material containing a wide variety of particulate and fiber length for optimum interlocking and filtering capabilities.
 2. The compost portion of compost filter berm shall be derived from well-decomposed organic matter source produced by controlled aerobic (biological) decomposition that has been sanitized through the generation of heat and stabilized to the point that it is appropriate for this application. Compost material shall be processed through proper thermophilic composting, meeting the U.S. Environmental Protection Agency's definition for a process to further reduce pathogens (PFRP). The compost portion shall meet the chemical, physical, and biological properties below.

Parameters	Units of Measure	Compost Filter Berm (Vegetated)
PH	pH units	5-8.5
Soluble Salt Concentration	dS/m (mmhos/cm)	Maximum 5
Carbon Dioxide	mg CO ₂ -C per g OM per day	<8
Physical Contaminants	%, dry weight basis	<1

- (b) Microblend Additive. Use Microblend Additive as developed by Rexius Forest Byproducts, Inc. or approved equal. The purpose of this product is adding immediate material stabilization and soil bonding properties, while providing long-term nutrient resources for the propagation of specific hydrocarbon degrading bacteria and structurally enhancing fungi and actinomycetes. All additives combined with compost/mulch materials must be tested, in replicate, for physical results at a certified erosion and sediment control laboratory and biologically tested for elevated beneficial microorganisms at a United States Compost Council, (USCC) Seal of Testing Assurance, (STA) approved testing laboratory.

Construction Requirements. Apply a herbicide as needed to all future filter berm locations to kill existing vegetation for proper soil contact.

Parallel to the base of the slope, or around the perimeter of affected areas, construct a trapezoidal berm at the dimensions of one foot height by two foot width. The base of the berm should be twice the height of the berm.

Compost filter berm dimensions should be modified based upon specific site (e.g., soil characteristics, existing vegetation, etc.) and climate conditions, as well as particular project related requirements. The severity of slope grade, as well as slope length will also influence the size of the berm.

Compost shall be uniformly applied using the three-wheeled berm building machinery. When applied, the compost should be directed at the soil surface, compacting, settling and shaping the berm.

Microblend Additive shall be applied/injected at a minimum rate of one pound per ten lineal feet to be confirmed by the Engineer.

On highly unstable soils, use compost filter berms in conjunction with appropriate structural measures. If structural measures are required, the Engineer instruct the Contractor as to type and location if the structural measures are not shown on the plans.

The Contractor will not use compost filter berms in areas of concentrated flow (i.e., ditches, streams, etc.)

Equipment. Pneumatic blower unit and three-wheeled berm making machinery shall be approved units capable of uniformly applying compost filter berm, up to three or four inches minus in length, up to ½ inch in width and thickness and 60% moisture content or less. The unit must also provide an application hose of 300 feet in length or greater to allow for maximum site accessibility. The unit must have a dust suppression system to eliminate dust generation and reduce airborne dust.

Performance. Remove and dispose of captured sediment behind the berm when sediment depth reaches 1/3 to ½ of the overall height of the berm.

The Contractor is responsible for providing compost filter berm that provides effective erosion control measures. The Contractor may, with approval from the Engineer, work outside the construction limits to establish a working erosion control system.

Method of Measurement. Compost filter berm will be measured by the linear foot. completed. The length of compost filter berm will include site preparation, labor, equipment, materials, and incidentals required to comply with the requirements of this specification.

Basis of Payment. The accepted quantities of compost filter berm will be paid at the contract unit price per linear foot of compost filter berm.

Payment will be made under:
Pay Item
Compost filter berm

Pay Unit Symbol
LFT

Compost Filter Sock

Description:

This work shall consist of furnishing compost filter sock, compost soil, seed, labor, equipment, and its installation. This product shall be used to hold a compost soil material that will sustain vegetation while allowing water to penetrate through the sock into a dry ditch detention system. The filter sock will hold the soil material in place while strengthening the vegetation and protecting the ditch from erosion. The sock shall be filled with specified compost material and injected with seed. Sock shall be rolled to a 4" depth.

1. Fill Material for Filter Sock

Fill material shall be by volume 1/3 compost, 1/3 loam soil (A2 or A 4 classification) and 1/3 course sand.

Compost material for filter socks will be weed free and derived from a well-decomposed source of organic matter. The compost shall be produced using an aerobic composting process meeting CFR 503 regulations, including time and temperature data indicating effective weed seed, pathogen and insect larvae kill. The compost shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below will follow USCC TMECC guidelines for laboratory procedures. Payment shall be included in the cost of the filtersock. The material will meet the following conditions:

- A. PH – 5.0-8.0 in accordance with TMECC 04.11-A, "Electrometric pH Determinations for Compost"
- B. Particle size – 99% passing a 1" sieve, 90% passing a ¾" sieve and a minimum of 70% greater than the 3/8" sieve. A total of 98% shall not exceed 3 inches in length, in accordance with TMECC 02.02-B, "Sample Sieving for Aggregate Size Classification"
- C. Moisture content of less than 60% in accordance with standardized test methods for moisture determination.
- D. Material shall be relatively free (<1% by dry weight) of inert or foreign man made materials.
- E. All test results shall be submitted to the engineer along with a sample for approval prior to being used and must comply with all local, state and federal regulations.

2. Seed

Seed Mixture “U” shall be injected into compost soil mixture at the rate 0.05 lbs. per lineal feet of sock. The cost of the seed shall be paid for in the cost of the compost filter sock.

3. Compost Filter sock

Compost filter sock shall be 8 inches in diameter and constructed of a woven 5 mil, tubular, HDPE, 3/8 “ knitted mesh material made by Filtrexx International. Filter sock shall be maintained to assure a proper drainage and water flow.

3.0 Construction and installation

Channel Socks

1. 8” Socks of tubular netted mess material shall be filled with compost soil material as specified to line the dry swale detention channel to protect underlying soils and provide a growing medium for vegetation. The filter socks shall be positioned parallel to the dry swale ditch. Socks shall be rolled to a 4” depth then pressed tightly together so no gaps exist between socks.
2. All voids between socks and dry swale detention channel shall be filled with compost soil material and shall be included in the cost of the compost filter sock.
3. Socks shall be secured in place according to manufactures recommendations.
4. Sock seams shall overlap and be tied together per manufactures recommendations so as to form a continuous sausage for the length of the ditch being covered.
5. Socks shall be placed as shown on plans or as directed by the engineer.
6. Socks shall be seeded with Seed Mixture U at the time of manufacturing.

4.0 Maintenance:

1. The contractor will maintain filter socks in a functional condition at all times and routinely inspect to see if material is functioning properly during storm events.
2. Repairs to filter socks will be made in a timely manner.

5.0 Performance:

1. Where the filter sock deteriorates or fails, it will be repaired or replaced within 24 hours.

6.0 Application requirements:

Filter socks shall be made using a tubular, woven mesh netting material, filled with compost passing the above specifications for compost products as outlined in 2.0. Welded mesh materials will not be acceptable.

7.0 Method of measurement:

Bid items shall show measurement as compost filter sock per linear foot installed.
1000 linear feet of channel sock equates to a 250 foot channel by 4 feet wide.

8.0 Basis of Payment:

Compost Filter Sock will be paid for at the contract unit price per lineal feet.

Compost Filter Sock

1.0 Description:

This work shall consist of furnishing, installing, maintaining, dispersing, and removal as needed. Water permeable compost filter sock will be used to contain soil erosion and sediment from water moving off site into adjacent waterways or storm water drainage systems. Compost filter socks may be used as a construction practice of inlet protection for operational storm drainage systems, check dams in the clear zone as an option where straw bales are used, lime water filtration for under drain outlets and perimeter protection for sediment control as an acceptable alternative to silt fence.

2.0 *Fill Material for Filter Sock*

Compost will be used as fill material for filter socks and will be weed free and derived from a well-decomposed source of organic matter. The compost shall be produced using an aerobic composting process meeting CFR 503 regulations, including time and temperature data indicating effective weed seed, pathogen and insect larvae kill. The compost shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below will follow USCC TMECC guidelines for laboratory procedures. The material will meet the following conditions:

- A. PH – 5.0-8.0 in accordance with TMECC 04.11-A, “Electrometric pH Determinations for Compost”
- B. Particle size – 99% passing a 1” sieve, 90% passing a ¾” sieve and a minimum of 70% greater than the 3/8” sieve. A total of 98% shall not exceed 3 inches in length, in accordance with TMECC 02.02-B, “Sample Sieving for Aggregate Size Classification”
- C. Moisture content of less than 60% in accordance with standardized test methods for moisture determination.
- D. Material shall be relatively free (<1% by dry weight) of inert or foreign man made materials.
- E. All test results shall be submitted to the engineer along with a sample for approval prior to being used and must comply with all local, state and federal regulations.

3. *Filter sock*

Filter sock shall be constructed of a woven material made by Filtrexx International. Filter socks shall be maintained to assure a proper drainage and water flow. The filter socks shall be positioned so as to provide complete physical barrier to the drain itself, allowing sediment to collect on the outside of the filter socks. Contractor shall provide shop drawings to the project Engineer for the filter socks installation. Prior

to final seeding the contractor shall disperse the compost from the sock across the site and remove all sock material and all anchors from the site.

3.0 Construction and installation

Inlet protection

1. Filter socks maybe used as a form of inlet protection on construction sites which require protection against sediment laden water.
2. Filter socks will be placed at locations indicated on plans and/or as directed by the engineer. Filter socks should be installed in a pattern that allows complete protection of the inlet area
3. Installation of filter socks shall ensure a minimal overlap of at least one foot on either side of the opening being protected. The filter socks will be anchored to the soil behind the curb using staples, stakes or other devices capable of holding the material in place.
4. Standard sizes of filter socks for inlet protection should be 8" diameter products.

Perimeter Protection

1. For perimeter protection a 8"-12" filter sock shall be used depending on site conditions.
2. When breaks are made during installation of the filter sock contractor shall ensure a minimal overlap of at least one foot. Filter sock shall be anchored using staples or stakes according to manufacturer's recommendations.
3. Seed Mixture "R" shall be injected into compost soil mixture at the rate 0.05 lbs. per lineal feet of sock. The cost of the seed shall be paid for in the cost of the compost filter sock.

Check Dam

1. Filter socks shall be 12" in diameter, but engineer may require a larger sock (18") do to a high volume of flow and a needed to contain more sediment laden water in the ditch line.
2. Contractor may elect to stack the filter socks on top of the other in order to achieve a greater height. This process will be in accordance to manufacturer's specifications.
3. When using ditch checks in a permanent solution all filter socks shall be embedded with seed according to manufacturer specifications.

4.0 Maintenance:

1. The contractor will maintain filter socks in a functional condition at all times and routinely inspect to see if material is functioning properly during storm events.
2. Repairs to filter socks will be made in an

3. The contractor shall remove sediments collected at the base of the filter sock when they reach 1/3 of the exposed height of the filter sock, or as directed by the Engineer.
4. The contents of filter sock will be dispersed on site when no longer required, as determined by the Engineer. The netting material will be disposed of in normal trash containers or removed by the contractor.

5.0 Performance:

1. Contractor is responsible for establishing a working erosion control system and may, with approval of the engineer, work outside the minimum construction requirements as needed within INDOT R/W.
2. Where the filter sock deteriorates or fails, it will be repaired or replaced within 24 hours.

6.0 Application requirements:

Filter socks shall be made using a tubular, woven mesh netting material, filled with compost passing the above specifications for compost products as outlined in 2.0. Welded mesh materials will not be acceptable.

7.0 Method of measurement:

Bid items shall show measurement as compost filter sock per linear foot installed.

8.0 Basis of Payment:

Temporary Filter Sock for perimeter protection will be paid for under contract unit price per lineal feet installed.

Temporary Check Dams, Filter Sock will be paid for at the contract unit price per lineal feet installed.

Temporary Ditch Inlet Protection filter sock will be measured per each unit installed.

9.0 Pay Item

Temporary Filter Sock	m(LFT)
Temporary Check Dam, Filter Sock	m(LFT)
Temporary Ditch Inlet Protection	Each

10/01/02
COMPOST SOIL BLANKET

I. DESCRIPTION

- A. This work shall consist of furnishing and applying a 2 ½ inch average blanket cover of blended compost soil mulch with R mix seed to landscape areas to vegetate and reduce erosion for long term stabilization.
- B. A proof of certification as a compost supplier of materials suitable for use in specified compost soil blanket shall be submitted to the Engineer for approval prior to installation.
- C. Submit a drawing depicting the staging of the application of the compost soil blanket with seed.

II. MATERIALS

- A. Use a blend of 50% to 70% well-decomposed, stable, weed-free compost and 50% to 30% sandy loam that conforms to the following:
 - 1. The pH range must be 5.5 to 8.0.
 - 2. A varied particle size with a maximum of three inches in length is recommended for effectiveness and ease of application. Very coarse composts should be avoided. Compost material shall be derived from a well-decomposed organic matter source and shall be produced by the aerobic (biological) decomposition of organic matter. The organic matter may include, but is not limited to, a wide variety of organic sources such as well-decomposed vegetative matter, leaves and yard trimmings, Class A Biosolids (as defined in Federal Regulations 40 CFR Part 503), food scraps, composted manures, paper fiber, wood, bark or combinations of these products. The compost shall be free of any refuse (<1% by dry weight), contaminants or any material toxic to plant growth. It is recommended that all compost material supplied shall be processed to meet the U.S. Composting Council's Seal of Testing Assurance Program, or equivalent, for control of noxious weeds, pathogen and vector attraction, and disclosure of heavy metals, nutrient levels and maturity level of compost. All lab analysis to follow testing procedures of the U.S. Composting Council's TMECC manual (Note: Information is available on-line at: www.compostingcouncil.org).
 - 3. Topsoil portion of the material shall be classified as a sandy loam.
 - 4. Soluble salt concentration may vary, but must be reported.
 - 5. Moisture content is to be within the range of 40% to 60%. Submit test results depicting moisture content of material for review and approval by Engineer.
 - 6. A sample of the material shall be submitted to the Engineer for approval prior to be used and must comply with local, county or state regulations.
 - 7. Microblend Additive as developed by Rexius Forest By-Products Inc. or approved equal shall be combined with compost mulch materials must be tested in replicate, for physical results, at a certified erosion and sediment control laboratory and biologically tested for elevated beneficial Microorganisms at a United States Compost Council, (USCC) Seal of Testing Assurance, (STA) Approved testing Laboratory.
- B. 16-16-16, 50% slow release fertilizer is to be mixed into the compost soil mulch and applied at a rate of **** lbs/sy to promote proper seed germination and establishment.
- C. Seed used shall be INDOT Standard Seed mix unless specified otherwise by Engineer.

III. CONSTRUCTION

A. INSTALLATION

1. Remove existing vegetation including exotic invasive species in designated areas in most appropriate manner based on site conditions immediately prior to installation.
2. Scarify slopes and remove large clods, rocks, stumps, large roots and debris on slopes where vegetation is to be established.
3. Provide aeration across all areas to receive seeding. Two passes with aerator will be necessary. Aerator will provide ½" diameter, ¾" depth aeration holes. Time between aeration and compost soil mulch application shall be limited to a maximum of three days.
4. Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent airborne dust from discharging into the atmosphere and surface waters.
5. Compost soil blanket shall be uniformly applied using an Express Blower or other approved equal. Using the pneumatic blower, project compost soil mulch topsoil directly on soil surface, thereby establishing good soil contact and preventing water from moving between the soil-compost interfaces.
6. Apply compost soil mulch topsoil layer approximately 2 ½ inches over the area. Overlap it into existing vegetation as directed by Engineer. Fill in existing rills and gullies with compost soil mulch to meet grade.
7. Compost soil blanket will not withstand areas of concentrated water flow. On highly unstable soils, use compost soil mulch in conjunction with appropriate structural measures. If structural measures are required, notify Construction Engineer.
8. Apply R mix seed using the "Express Blower Supplemental (Seed) Injection System". All seeding systems must include an accurate mechanized calibration system that insures proper integration and integration rates of seed or seed fertilizer mix throughout topsoil profile (terrasedding). Natural conditions and time of year should be taken into consideration if irrigation is not available. Re-seed areas that exhibit unsatisfactory growth and backfill and seed eroded areas.
9. Pneumatic blower shall be an approved unit capable of uniformly applying soil mix, mulch, wood chips, etc., up to three or four inches minus in length, up to ½ inch in width and thickness and 60% moisture content or less. The unit must also provide an application hose of 300 feet in length or greater to allow for maximum site accessibility. The unit must have a dust suppression system to eliminate dust generation and reduce airborne dust.
10. Compost soil blanket shall be watered for a period of 30 days following installation. The blanket shall be misted every day for the first 7 days and 3 days a week for the remainder of the watering period. Water shall be applied to maintain a constant moisture range of 40% to 60 % during the 30 day period. Watering shall not displace or cause compost soil blanket to erode. Watering maybe continued or extended by the project engineer if material is placed in the dry season or a period of drought. Any watering beyond the 30day period will be paid for separately.

B. PERFORMANCE

1. Bare areas are to be covered within three days of the completion of aeration with a compost soil mulch topsoil and permanent R mix cover.

2. All existing and foreseeable future conditions that affect the work inside and outside the site limits must be acknowledgeable as the Contractor's responsibility. Contractor may, with approval from Engineer, work outside the construction limits as needed to establish the compost soil blanket.
3. Methods used to control erosion shall comply with applicable Federal, State, and Local regulations.

C. GUARANTEE

1. Areas treated with the compost soil blanket shall be guaranteed for two years beginning at the time of completed installation. Areas damaged directly or indirectly, as a result of contractor's work prior to final acceptance of the project shall be repaired and replaced/seeded. Seeded areas that are dead or not in satisfactory condition during or at the end of the guarantee period shall be replaced or over seeded by Contractor.
2. The Contractor shall maintain the compost soil mulch blanket in a functional condition at all times and it shall be routinely inspected. The Contractor shall immediately correct all deficiencies. Replacement seed used for over seeding shall be of the same variety and species installed, unless directed otherwise by the Engineer. Final Acceptance shall be made by Engineer upon end of warranty period.

IV. METHOD OF MEASUREMENT

The work performed and the materials furnished in accordance with this project will be measured in per unit terms each.

1. Each unit cost to include site preparation and installation of each item, including materials, labor, tools machinery and incidentals required to comply with specified installation methods and establishment requirements for Compost Soil Blanket.
2. Watering shall be measured by the MG (mega gallon).

V. METHOD OF PAYMENT

1. The accepted quantities of application of compost soil blanket will be paid for at the contract unit price for the specified material installed complete in place as approved by the Engineer. This price and payment will be full compensation for staging the work, preparing the site and furnishing and placing all materials, including mulch, soil, compost, fertilizer and seed.
2. Watering will be paid for at the contract unit price MG (mega gallon). This price shall include all equipment, labor, material, and mobilization/demobilization.

BASIS OF PAYMENT

Payment will be made according to the following units:

<u>Pay Item</u>	<u>Unit</u>
Compost Soil Blanket	Square Yard
Water.....	MG (mega gallon)

SPECIAL PROVISIONS
SECTION 617
EROSION CONTROL MIX

Description. This work shall consist of furnishing and placing approved erosion control mix as a mulch on designated slopes and environmentally sensitive areas in conformity with the plans and specifications or as directed by the Resident.

Materials. The erosion control mix shall be an organic substance produced by the biological and biochemical decomposition of source separated compostable materials, separated at the point of waste generation, that may include; forest residues, bark, paper mill flume grit, and aged wood waste. Erosion control mix shall be free of refuse, physical contaminants, material toxic to plant growth, and reprocessed wood products. Erosion control mix may contain rocks less than 100 mm [4 inches] in diameter. Erosion control mix shall conform to following:

- A. pH between 5.0 - 8.0
- B. Particle size:
 - 1) 100% passing a 150 mm [6 inch] screen
 - 2) 80% > 19 mm [3/4 inch]
- C. Soluble salts content < 4.0 mm hos/cm

Construction Requirements. Erosion control mix shall be spread evenly and uniformly over the designated area, a minimum of 100 mm [4 inches] or as called for on the plans or by the Resident.

Method of Measurement. Erosion control mix shall be measured by the volume of mix completed in place, in units of m³ [cubic yards]. Measurements will be made along the slope of the ground or at the discretion of the Resident.

Basis of Payment. The accepted areas mulched will be paid for at the contract price per unit, which shall be full compensation for furnishing and installing the composted bark mix.

<u>Pay Item</u>	<u>Pay Unit</u>
617.381 Erosion Control Mix	m ³ [cubic yard]

920.02 SOIL AMENDMENTS.

920.02.01 Limestone. Limestone shall be an approved agricultural product manufactured and labeled for increasing soil pH. Limestone shall contain at least 85 percent calcium and magnesium carbonates. Dolomitic limestone shall contain at least 10 percent magnesium as magnesium oxide and 85 percent calcium and magnesium carbonates.

Limestone shall be supplied as a fine powder, or as pellets produced from fine powder, that conforms to the following:

LIMESTONE GRADING ANALYSIS	
SIEVE Size Number	PASSING BY WEIGHT Minimum %
10	100
20	98
100	50

920.02.02 Sulfur. Sulfur shall be an approved agricultural product manufactured and labeled for reducing soil pH. Sulfur labeled as a fertilizer may also be used to supply sulfur as a plant nutrient. Sulfur shall be supplied as a fine powder or pelletized powder with a minimum purity of 90 percent elemental sulfur.

920.02.03 Iron Sulfate. Iron sulfate shall be an approved agricultural product manufactured and labeled for reducing soil pH. Iron sulfate labeled as a fertilizer may also be used to supply sulfur or iron as a plant nutrient. Iron sulfate shall be supplied as a fine powder or pelletized powder with a minimum purity of 15 percent water soluble iron derived from ferrous sulfate.

920.02.04 Gypsum. Gypsum shall be an approved agricultural product manufactured and labeled as an aid for improving soil structure and removing soil soluble salts, or as a fertilizer to supply calcium and sulfate. Gypsum shall be supplied as a fine powder or pelletized powder with a minimum purity of 68 percent calcium sulfate dihydrate.

920.02.05 Compost.

- (a) **Compost Types.** Compost shall be either Type A (biosolids) or Type B (source-separated), and will be subject to approval by the Landscape Operations Division as follows:



- (1) **Biosolids Compost (Type A).** Type A Compost shall be approved for distribution by the Maryland Department of the Environment (MDE).
- (2) **Source-Separated Compost (Type B).** Type B Compost shall be produced by a compost operator certified by the Maryland Department of Agriculture (MDA).

Type B Compost shall be tree leaf compost or non-tree leaf compost. Type B Compost produced from lawn clippings shall be tested for contaminants in conformance with Maryland law and regulations.

- (b) **Stability.** Compost shall be biologically mature and no longer able to reheat to thermophilic temperatures.
- (c) **pH.** Compost shall have a pH of 6.0 to 7.5 except when specified in Sections 710 and 711 where it shall have a pH of 6.0 to 7.0.
- (d) **Soluble Salts.** Type A Compost shall have a soluble salt concentration less than 10.0 mmhos/cm, and Type B Compost shall have soluble salts concentration less than 5.0 mmhos/cm.
- (e) **Moisture.** Compost shall have a moisture content of 30 to 55 percent.
- (f) **Particle Size and Grading.** Compost shall be screened so that it has a uniform particle size of 0.5 in. or less, with grading analysis as follows.

COMPOST GRADING ANALYSIS	
SIEVE SIZE mm	PASSING BY VOLUME Maximum %
4.75	90
0.425	25
0.75	2.2

920.02.06 Peat Moss. A milled sphagnum peat moss with negligible woody substances.

920.02.07 Aged Pine Bark Fines. Derived from the bark of pine trees that have been composted and milled to a fineness approved for use by the Landscape Operations Division.

**PROPOSED MONTANA DEPARTMENT OF TRANSPORTATION
COMPOST SPECIFICATIONS.**

Accepted facility: Active MT DEQ operating permit. If biosolids are used as a feedstock- compliance with USEPA 40 CFR Part 503 Regulations.

Allowable Compost Feedstock Material: Agricultural vegetative residuals, leaf/yard trimmings, manure, animal carcass, wood residue, municipal biosolids [sewage sludge] food waste.

Particle Size: 90% [by volume] passing 1 inch screen.

% Moisture: 30% to 55%.

% Organic Matter: 30% minimum.

pH: 5.0 to 8.5.

C/N Ratio: 10 to 30:1.

Inert Material: <1%

Maturity: Stable, score of 5 or higher using Solvita test.

Soluble Salt Concentration [elec. Conductivity]: Maximum 11.0 mmhos/cm.

Compost Blanket:

Description

This work shall consist of furnishing, installing, maintaining, and seeding a water permeable *Compost Blanket* to reduce soil erosion and sediment by promoting the establishment of vegetation on sandy soils where vegetation is difficult to establish.

Materials

Compost:

Compost used for Compost Blankets shall be weed free and derived from a well-decomposed source of organic matter. The compost shall be produced using an aerobic composting process meeting CFR 503 regulations, including time and temperature data indicating effective weed seed, pathogen, and insect larvae kill. The compost shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below should follow USCC TMECC guidelines for laboratory procedures:

1. pH between 5.0-8.0 in accordance with TMECC 04.11-A, "Electrometric pH Determinations for Compost".
2. For seeded Compost Blankets, seed should be incorporated at the time of application in the entire depth of the compost blanket, at rates per foot, per square yard, or per acre, as acceptable to the engineer. The following particle sizes shall also be followed: 100% passing a 2" sieve; 99% passing a 1" sieve; minimum of 60% passing a ½" sieve. All other testing parameters remain the same. The seeding rates are generally similar or slightly higher than those used when considering application of seed via hydroseeding or other seeding methods.
3. Moisture content of less than 60% in accordance with standardized test methods for moisture determination.
4. Material shall be relatively free (<1% by dry weight) of inert or foreign man made materials.
5. A sample shall be submitted to the engineer for approval prior to being used and must comply with all local, state and federal regulations.

Construction Methods

1. Compost Blankets will be placed as directed. Unless otherwise specified, Compost Blankets should be installed at a minimum depth of 2".
2. The Compost Blanket shall be seeded at time of installation for establishment of permanent vegetation. The Engineer will specify seeding requirements.
3. Compost Blankets are not to be used in direct flow situations or in runoff channels.

Maintenance

1. The Contractor shall perform routine inspections and maintain the Compost Blanket in a functional condition at all times.
2. Where the Compost Blanket fails, it will be routinely repaired.
3. The Compost Blanket will be seeded on site, at rates and seed types as determined by the Engineer. Once vegetation is established, final seeding is not required.

Performance

1. The Contractor is responsible for establishing a working erosion control system and may, with approval of the Engineer, work outside the minimum construction requirements as needed.
2. Where the Compost Blanket deteriorates or fails, it will be repaired or replaced with a more effective approved alternative.

Measurement and Payment

The Contractor shall provide the Engineer with proof that a 2" Compost Blanket has been applied. This rate equals approximately 270 cubic yards of compost material per acre of application area. The Contractor will supply ample evidence showing this amount of material has been effectively placed (i.e., truck load tickets).

Compost Blanket will be measured and paid for as the actual number of acres measured along the surface of the ground over which the Compost Blanket is installed and accepted.

Payment will be made under:

Pay Item	Pay Unit
Compost Blanket	Acre