This is a guidance document with sample specification language intended to be inserted into project specifications on this subject as appropriate to the agency's environmental goals. Certain provisions, where indicated, are required for U.S. federal agency projects. Sample specification language is numbered to clearly distinguish it from advisory or discussion material. Each sample is preceded by identification of the typical location in a specification section where it would appear using the SectionFormat™ of the Construction Specifications Institute; the six digit section number cited is per CSI Masterformat™ 2004 and the five digit section number cited parenthetically is per CSI Masterformat™ 1995.

SECTION 31 25 73 (SECTION 02635) - STORMWATER MANAGEMENT BY COMPOST

SPECIFIER NOTE:

resource management: According to the U.S. Department of Agriculture, the United States loses more than 2 billion tons of topsoil each year to erosion. Erosion removes fertile soil rich in nutrients and organic matter, which reduces the ability of plants to establish, grow and remain healthy in the soil. A reduction in plant growth and subsequent plant residue causes less soil cover, allowing the erosion process to perpetuate and become worse.
Erosion not only causes loss of soil productivity but also creates water quality problems once the sediment leaves the site and enters surface waters. The U.S. EPA has declared that sediment contamination of our surface waterways is the biggest threat to our nation's water resources.
Construction and development projects, where soil is excavated or moved around, are particularly subject to erosion problems. In addition, heavy machinery and constant traffic can compact the soil creating a "hard pan" that repels water, increases runoff, and prevents plant growth.
Compost replaces valuable organic matter and soil nutrients essential to vegetative establishment and long-term plant health.

toxicity/IEQ: Within the past few years, laboratory-, greenhouse-, and pilot-scale research has indicated that composting provides a cost-effective solution for managing hazardous industrial waste streams (solid, air, or liquid). Compost has also been found to successfully remediate soil contaminated with toxic organic compounds (such as solvents and pesticides) and inorganic compounds (such as toxic metals). Refer to U.S. EPA Report - Analysis of Composting as an Environmental Remediation Technology; http://www.epa.gov/epaoswer/non-hw/composting/pubs.htm#anacomp

performance: Compost breaks up compacted soils and increases soil structure allowing water to infiltrate the soil surface. If immediate planting is not feasible, compost can act as a protective layer or sediment filter until vegetation can be established.
Compost-based erosion and sediment control systems have several advantages over more traditional storm water best management practices (BMPs) such as geotextile blankets, including:
- increasing water holding capacity of soil which reduces runoff.
- buffering rainfall energy, which prevents soil compaction.
- facilitating plant growth by capturing and retaining moisture and providing a suitable microclimate and nutrients for seed germination.
- stimulating microbial activity to improve the soil structure.
- buffering soil pH which can increase vegetation establishment and growth.

EPA GreenScapes provides an Erosion Control Calculator available online that helps estimate the cost of using environmentally beneficial compost filter berms or compost filter socks for erosion control, rather than conventional silt fences. The Cost Calculator demonstrates that environmentally preferable erosion control methods are very cost competitive for all project sizes and durations, and that they offer significant savings for projects that run for more than a few months.
http://www.epa.gov/epawaste/conserve/rrr/greenscapes/tools/index.htm

Refer to the U.S. EPA Greenscapes program on environmentally beneficial landscaping for additional information; http://www.epa.gov/epaoswer/non-hw/green/pubs.htm

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:
1. Compost blanket.
2. Compost filter berm.
3. Compost filter sock.
4. Compost soil management.

B. Related Sections:
1. Section 01 57 19.13 (01354) – Environmental Management: Water monitoring for surface and groundwater.
2. Section 31 10 00 (02230) – Site Clearing: Temporary erosion and sedimentation control measures.
3. Section 32 90 00 (02900) – Planting: Compost used as soil conditioners for landscaping.

1.2 SUBMITTALS

A. Product data. Unless otherwise indicated, submit the following for each type of product provided under work of this Section:

SPECIFIER NOTE:
Specifying local materials may help minimize transportation impacts; however it may not have a significant impact on reducing the overall embodied energy of a building material because of efficiencies of scale in some modes of transportation.
Green building rating systems frequently include credit for local materials. Transportation impacts include: fossil fuel consumption, air pollution, and labor.
USGBC-LEED™ v3 includes credits for materials extracted/harvested and manufactured within a 500 mile radius from the project site. Green Globes US also provides points for materials that are locally manufactured.

1. Local/Regional Materials:
a. Sourcing location(s): Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.
b. Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
c. Product Value: Indicate dollar value of product containing local/regional materials; include materials cost only.
d. Product Component(s) Value: Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.

SPECIFIER NOTE:
The Food, Conservation, and Energy Act of 2008 (also known as the 2008 U.S. Farm Bill) largely continues programs of the Farm Security and Rural Investment Act of 2002 (2002 Farm Bill) http://www.usda.gov/farmbill/ Section 9002 requires each Federal Agency to develop a procurement program which will assure that items composed of biobased products will be purchased to the maximum extent practicable and which is consistent with applicable provisions of Federal procurement law. USDA designates biobased products for preferred Federal procurement and recommends biobased content levels for each designated product.
USGBC-LEED™ v3, for example, includes credits for use of rapidly renewable materials, which USGBC describes as plants harvested within a ten-year cycle.

Green Globes – US, provides credit for integration of materials from renewable sources that have been selected based on life-cycle assessment.

2. Biobased materials:
   a. Indicate type of biobased material in product.
   b. Indicate the percentage of biobased content per unit of product.
   c. Indicate relative dollar value of biobased content product to total dollar value of product included in project.

SPECIFIER NOTE:
The U.S. Composting Council (USCC) certifies compost products under its Seal of Testing Assurance (STA) Program. Compost producers whose products have been certified through the STA Program provide customers with a standard product label that allows comparison between compost products. Refer to the USCC; http://www.compostingcouncil.org/index.cfm

3. Evidence of certification under the U.S. Composting Council (USCC) Seal of Testing Assurance (STA) Program.

4. Field Quality Control reports.

1.3 QUALITY ASSURANCE

A. Certification: Provide compost products that are certified to specified product parameters in accordance with the U.S. Composting Council (USCC) Seal of Testing Assurance (STA) Program.

PART 2 - PRODUCTS

SPECIFIER NOTE:
EO 13423 includes requirements for Federal Agencies to use “sustainable environmental practices, including acquisition of biobased, environmentally preferable, energy-efficient, water-efficient, and recycled-content products”

Specifically, under the Sustainable Building requirements per Guiding Principle #5 Reduce Environmental Impact of Materials, EO13423 directs Federal agencies to “use products meeting or exceeding EPA's recycled content recommendations” for EPA-designated products and for other products to “use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of the total value of the materials in the project.”

Executive Order 13514; *Federal Leadership in Environmental, Energy, and Economic Performance*; was signed on October 5, 2009. http://www.ofee.gov/execorders.asp It expands upon the environmental performance requirements of EO 13423.
http://www1.eere.energy.gov/femp/regulations/printable_versions/eo13423.html

EO 13514 sets numerous federal requirements in several areas, including sustainable buildings and communities. Federal agencies must implement high performance sustainable federal building design, construction, operation and management, maintenance, and deconstruction, including:

- Ensuring all new Federal buildings, entering the design phase in 2020 or later, are designed to achieve zero net energy by 2030.
- Ensuring all new construction, major renovations, or repair or alteration of Federal buildings comply with the Guiding Principles of Federal Leadership in High Performance and Sustainable Buildings http://www1.eere.energy.gov/femp/pdfs/mouhighperfsustainfedfacs.pdf
- Ensuring at least 15% of existing agency buildings and leases (above 5,000 gross square feet) meet the Guiding Principles by fiscal year 2015 and that the agency makes annual progress towards 100% compliance across its building inventory.

Additionally, for USDA-designated biobased products, Federal agencies must use products meeting or exceeding USDA's biobased content recommendations; and for other products, biobased products made from rapidly renewable resources and certified sustainable wood products.

2.1 COMPOST

A. Compost quality: Sanitized, mature compost free of identifiable feedstock constituents and offensive odors. Biosolids compost shall comply with the Standards for Class A biosolids outlined in 40 Code of Federal Regulations (CFR) Part 503.

SPECIFIER NOTE:
For current designations under the Federal Biobased Products Preferred Procurement Program (FB4P), refer to www.biobased.oce.usda.gov. As of January 4, 2010, the Federal Register includes designations for approximately 60 product types. The requirements for purchasing biobased items apply to those items directly purchased by the federal agency. Under a construction contract, the contractor's use of hydraulic fluid in its bulldozers and backhoes is incidental to the purpose of its contract, so the contractor is not required to use biobased hydraulic fluids. The Office of the Federal Environmental Executive (OFEE) recommends that agencies encourage the use of these items, however.
Currently designated items that affect construction include:
- Roof Coatings
- Water Tank Coatings
- Adhesive and Mastic Removers
- Composite Panels
- Fertilizers
- Plastic Insulating Foam
- Carpet and Upholstery Cleaners
- Carpets
- Dust Suppressants
- Packaging Films
- Glass Cleaners
- Hydraulic Fluids – Stationary Equipment
- Wood and Concrete Sealers
- Cleaners

The USDA currently has identified about 150 items for which it is collecting test data needed for the additional designations of items that will extend preferred procurement status to include all qualifying biobased products.

1. Biobased Content: Minimum **[100] [xxxx]** percent.

SPECIFIER NOTE:
A compost blanket is a layer of loosely applied compost that is placed on the soil in disturbed areas to control erosion and retain sediment resulting from sheet-flow runoff. It can be used in place of traditional sediment and erosion control tools such as mulch, netting, or chemical stabilization.
The American Association of State Highway Transportation Officials (AASHTO) and many individual state Departments of Transportation (DOTs) have issued specifications for compost blankets. These specifications describe the quality and particle size distribution of compost to be used in compost blankets.
Following is an example:

B. Compost Blanket: Provide blanket in accordance with AASHTO specification MP 10-03;, *Compost for Erosion/Sediment Control (Compost Blankets),* American Association of State Highway Transportation Officials, Washington, D.C. and with product parameters as follows:

1.	Particle size:	3/8-1/2 in. screen and 2-3 in. screen (ratio = 3:1)
2.	Moisture content:	20-50%
3.	Soluble salt:	3.0 - 6.0 mmhos/cm
4.	Organic matter:	40 - 70%

5. pH: 6.0 - 8.0
6. Nitrogen content: 0.5 - 2.0%
7. Human made inerts: 0.0 - 1.0%
8. Application rate/size: 3/4 - 3 in. depth

SPECIFIER NOTE:
A compost filter berm is a dike of compost that is placed perpendicular to sheet flow runoff to control erosion in disturbed areas and retain sediment. It can be used in place of a traditional sediment and erosion control tool such as a silt fence. The compost filter berm, which is trapezoidal in cross section, provides a three-dimensional filter that retains sediment and other pollutants (e.g., suspended solids, metals, oil and grease) while allowing the cleaned water to flow through the berm.
Following is an example:

C. Compost Filter Berm: Provide berm in accordance with AASHTO specification MP 9-06 *Standard Specification for Compost for Erosion/Sediment Control (Filter Berms and Filter Socks*) , and with product parameters as follows:
1. Particle size: 3/8-1/2 in. screen and 2-3 in. screen (ratio = 1:1)
2. Moisture content: 20-50%
3. Soluble salt: 4.0 - 6.0 mmhos/cm
4. Organic matter: 40 - 70%
5. pH: 6.0 - 8.0
6. Nitrogen content: 0.5 - 2.0%
7. Human made inerts: 0.0 - 1.0%
8. Application rate/size: 1’ - 2' H x 2.5’ - 4' W

SPECIFIER NOTE:
A compost filter sock is a type of contained compost filter berm. It is a mesh tube filled with composted material that is placed perpendicular to sheet-flow runoff to control erosion and retain sediment in disturbed areas. The compost filter sock provides a three-dimensional filter that retains sediment and other pollutants (e.g. suspended solids, nutrients, and motor oil) while allowing the cleaned water to flow through. The filter sock can be used in place of a traditional sediment and erosion control tool such as a silt fence or straw bale barrier.
Compost filter socks can be vegetated or unvegetated. Vegetated filter socks can be left in place to provide long-term filtration of stormwater as a post-construction best management practice (BMP). The vegetation grows into the slope, further anchoring the filter sock. Unvegetated filter socks are often cut open when the project is completed, and the compost is spread around the site as soil amendment or mulch.

D. Compost Filter Sock: Provide **[unvegetated] [vegetated]** filter sock in accordance with AASHTO specification MP 9-06.
1. Size: **[8] [12] [18] [24] [xxxx]** inches in diameter.
2. Mesh Sock: Biodegradable.

SPECIFIER NOTE:
Healthy soil provides important stormwater management functions including efficient water infiltration and storage, adsorption of excess nutrients, filtration of sediments, biological decomposition of pollutants, and moderation of peak stream flows and temperatures. In addition, healthy soils support vigorous plant growth that intercepts rainfall, returning much of it to the sky through evaporation and transpiration.

E. Compost for Soil Management: Provide organic matter content of 35% to 65%, and a carbon to nitrogen ratio below 25:1. Coordinate with work of Section 32 90 00 (02900) – Planting.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Compost Blanket: Apply compost to the soil surface in a uniform thickness. Extend minimum 3 feet over the shoulder of the slope.
   1. Slopes: Apply on slopes between 4:1 and 1:1, unless otherwise indicated.

B. Compost Filter Berm: Apply compost to the soil surface in a uniform thickness**;** compact and shape into a trapezoid. **[Vegetate by hand.] [Vegetate by incorporating seed into the compost prior to installation.]**

C. Compost Filter Sock: Do not trench. After placing filter sock, anchor to slope **[with stakes driven through the center of the sock at regular intervals] [with stakes placed on the downstream side of the sock].** Direct ends of the filter sock upslope. **[Vegetate by incorporating seed into the compost prior to installation.]**

D. Compost for Soil Management: Amend soil **[where indicated on drawings] [in disturbed areas]** or import topsoil mix of sufficient organic content and depth to meet the specified requirements. Coordinate with work of Section 32 90 00 (02900) – Planting for topsoil analysis, recommended compost requirements for specified plants, and landscape commissioning.

SPECIFIER NOTE:
The following recommendations and formula were developed by the Washington State Department of Ecology for use in the Washington area.
Edit as necessary for project.

1. Amendment Rate: **[25% - 30% compost by volume for planting areas; 15% compost by volume for turf areas.] [2" – 4" of compost into upper 8" – 12" of soil.] [xxxx] [Provide minimum 8 inch depth of soil with 10% Soil Organic Matter (SOM) content in planting areas, and 5% SOM content in turf areas. Unless otherwise indicated, use the following equation to calculate compost application rates necessary to achieve the specified SOM**

$$CR = D * \frac{SBD * (SOM\%-FOM\%)}{SBD * (SOM\% - FOM\%) - CBD * (COM\% - FOM\%)}$$

Where:
CR = Compost application rate (inches) calculated to achieve the target final organic matter (FOM)
D = Depth of finished incorporation (inches)
SBD = Soil bulk density (lb/cubic yard dry weight; to convert SBD from g/cm3 units to lb/cubic yard, multiply by 1697)
SOM % = Initial soil organic matter(%)
FOM% = Final target soil organic matter(%)
CBD = Compost bulk density (lb/cubic yard dry weight; to convert CBD from lb/cubic yard "as is" to lb/cubic yard dry weight, multiply by solids content)
COM% = Compost organic matter (%)]

2. Compacted subsoils: Scarify minimum 4 inches below the 8 inch deep amended layer (for a finished uncompacted depth of 12 inches).
3. Planting areas: Unless otherwise indicated, mulch with minimum 2 inches of organic material.

3.2 FIELD QUALITY CONTROL

A. Water: Coordinate with work specified in Section 01 57 19.13 (01354) – Environmental Management to provide water monitoring for surface and groundwater.

SPECIFIER NOTE:
The erosion potential of a soil is of concern in vegetated channels, road embankments, dams, levees, spillways, construction sites, etc.

1. Assess potential effects of soil management practices on soil loss in accordance with ASTM D6629. Assess erodibility of soil with dominant soil structure less than 7 to 8 cm in accordance with ASTM D5852.

SPECIFIER NOTE:
Soil depth and quality will make a significant difference in stormwater management by preserving or restoring soil stripped away during site development. A set of Best Management Practices (BMPs) has been researched and published by the Washington State Department of Ecology in its 2005 Stormwater Management Manual for Western Washington, Volume V Runoff Treatment BMPs, BMP T5.13 refer to: http://www.ecy.wa.gov/biblio/0510033.html or to http://www.soilsforsalmon.org
A slightly modified version of these BMPs has been implemented by King County Washington; refer to http://www.metrokc.gov/ddes/forms/ls-inf-SoilPost-ConStd.pdf

B. Soil Depth and Quality:
   1. Document in scale site drawing:
      a. Undisturbed areas: Areas of site remaining undisturbed with native vegetation and soil. Verify that these areas were protected from compaction during construction. Indicate total square footage.
      b. Disturbed areas: Areas of site disturbed by construction operations. Indicate stormwater management procedures implemented; identify where compost blankets, compost filter berms, compost filter socks, and compost soil management practices were implemented. Indicate size and quantity of compost blankets, berms, and socks; indicate total square footage of compost soil management.
   2. Compost Soil Management: For disturbed areas where stormwater management includes compost soil management, report results of the following:
      a. Visually inspect soil for compaction, scarification and amendment incorporation by digging at least one 12 inch deep test hole per acre for turf and at least one per acre for planting areas. Excavate test holes using only a garden spade driven solely by inspector's weight.
      b. Test 10 locations per landscaped acre (10 locations minimum) for compaction, using a simple rod penetrometer (a 4 foot long 3/8th inch diameter stainless steel rod, with and a 30 degree bevel cut into the side at that goes in 1/8 inch at the tip). Verify that rod penetrates to 12" depth driven solely by weight of **[Landscape Architect] [Civil Engineer] [Owner's Representative] [xxxx]** reviewing field quality inspection.
      c. Verify placement and depth of organic mulch material on all planting beds is as specified.
      d. Verify amendment rate for compost is as specified. **[Verify calculations to meet SOM content requirements were prepared by a qualified professional. Qualified professionals include certified Agronomists, Soil Scientists or Crop Advisors; and licensed Landscape Architects, Civil Engineers or Geologists.]**

END OF SECTION