US Composting Council

USCC Factsheets on Innovative Uses of Compost by State DOTs

Washington State Bioengineering

PROJECT SUMMARY

Many State Departments of Transportation (DOTs) are using composts made from recycled organic materials in their construction projects. The Washington State DOT (WSDOT) completed a project involving soil bioengineering on problematic slopes. Compost was used as part of the soil bioengineering solution.

The objectives of this project were to:

- Provide viable alternatives called soil bioengineering or "living" approaches for slope and shallow rapid landslide stabilization along different roadside environments.
- Educate WSDOT personnel in site selection and evaluation, and soil bioengineering techniques including construction, monitoring, and maintenance.
- Provide soil bioengineering decision making skills.
- Produce a report of the research project results.
- Educate the public about soil bioengineering alternatives.

The soil bioengineering work involved:

Willow wall construction
Willow walls with a brush layer base
Live crib wall construction
Cordon construction
Brush layering
Cedar bender board fencing
Planting diverse native vegetation
Seeding
Biosolids compost application on two sites.

The following conclusions are based on experience acquired during the design and construction phases of this project:

- Compost used on the Chelan site correlated to enhanced plant growth.
- Soil bioengineering projects can be constructed and used successfully on WSDOT projects. All three project sites are revegetating and appear stable.
- Communication and education are important components of any "new" technology.
- An interdisciplinary team, continuously involved in the project, is critical for success.

METHODOLOGY

Two of the three sites that were selected for this project included compost application:

State Route 971 – above Lake Chelan at Mile Post 8.22; a north facing slope, 630 ft. long by 70 ft. high; a chronic source of surface erosion and ditch maintenance needs (the Chelan site).

State Route 101 – near Lost Creek at Mile Post 174; a west facing slope, 180 ft. long by 86 ft. high; a site characterized by heavy marine clays (the Lost Creek Site).

Class A biosolids compost was used on the Chelan and Lost Creek sites. WSDOT specifications for compost require that the material be a "stable, decomposed organic solid waste that is the result of the accelerated, aerobic biodegradation and stabilization". The material must meet compost quality standards for pH, particle size, maturity, soluble salts, organic matter and inerts. Product acceptance is based upon the submittal of test results as well as feedstock verification. An additional requirement at the Chelan site was that the composted biosolids have a carbon to nitrogen ratio of 30:1. The use of a high carbon ratio product was used to suppress weeds and to enhance long-term survival of woody vegetation.

At the Chelan site, GroCo biosolids compost, obtained from Mt. Rainier Blower Services, was blown with a pneumatic blower truck onto two-thirds of the slope in December 1999 (see Figure 1).

The project specification was for a one-inch layer, but the contractor laid on a thicker cover because of the moisture content in the compost, and ran out of material before covering the entire site. The uncovered area was used as a control. The compost was incorporated into the soil using hand labor, but only within the terraces; the rest of the area had compost applied to the surface. The contractor building the terraces reported that the soil was much easier to work after compost application. The entire Chelan site was vegetated in April 2000, using Idaho fescue and annual ryegrass and was planted with a mixture of native shrubs and trees.

Compost was applied to the Lost Creek site in November 1999. Due to scheduling difficulties, compost was blown on

Figure 1. Applying Compost (Chelan Site)

by blower truck before the willow wall terraces were constructed, causing erosion problems and difficult footing for the construction crew.

RESULTS

At the Chelan site, when work resumed in March 2000, erosion had occurred in the control section, but in the section treated with compost, no erosion was observed. By the end of June, grass was established on all terraces, however, where the composted biosolids were applied, the annual ryegrass was thicker, greener, and withstanding drought conditions better than the control section (Idaho fescue) without compost (see Figure 2)

Figure 2. Chelan Site Vegetation Established

During the first year the shrubs and trees showed no measurable difference in growth rate between the two sections of the slope. In March of 2001 the control section, without compost, experienced a small slope failure. The remainder of the slope, with compost, was stable through the spring thaw. The terraces were repaired and additional compost was applied to the former control area.

ECONOMICS

A summary of the costs for the projects follows:

Chelan

Total WCC Crew Time (10.5 weeks)	$26,250.00
Total Materials Cost	$3,945.24
Vegetation Costs	$2,640.80
Biosolid Compost Application	$1,329.00
RA'S Salary and Per Diem	$5,522.00
Contractor/Excavation Costs	$7,296.10
Total Cost for Project	**$46,983.14**
Cost per Square Foot	**$1.96**

Lost Creek:

Total WCC Crew Time (8 weeks)	$20,000.00
Total Materials Cost	$210.82
Vegetation Costs	$1,131.64
Biosolid Compost Application	$3,200.00
RA Salary and Per Diem	$3,712.00
Geotechnical Rock Apron	$15,020.00
Total Cost for Project	**$30,774.46**
Cost per Square Foot	**$ 3.55**

A cost benefit study was conducted on these sites. Results indicated that soil bioengineering is an efficient and environmentally beneficial tool for roadside management. For every dollar invested in roadside stabilization, the soil bioengineering method generated more in benefits than the traditional method. Final results are published on the WSDOT website.

For More Information

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About the USCC: The United States Composting Council (USCC) is a national not-for-profit organization dedicated to the development, expansion and promotion of the composting industry. For more information visit www.compostingcouncil.org