



Marketing Plan to Increase Use of Compost & Mulch in Road Construction & Maintenance in Florida

January 2009

Prepared for:



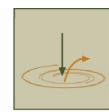
Florida Department of Transportation
605 Suwannee St., MS 37
Tallahassee, FL 32399-0450
*Under Research Grant Improved Markets
for Beneficial Use of Storm Debris*

Prepared by:



Sumter County
Public Works
319 E. Anderson Rd.
Bushnell, FL 33513

and



kessler consulting inc.
innovative waste solutions

Kessler Consulting, Inc.
innovative waste solutions
14620 N. Nebraska Ave., Bldg. D
Tampa, FL 33613



Marketing Plan to Increase Use of Compost & Mulch in Road Construction & Maintenance in Florida



Graphic Design by Brian Miller @ www.brian-e-miller.com



Table of Contents

Section	Page
1.0 Introduction and Background.	1
1.1 Introduction and Background	1
1.2 Goals and Objectives.	1
1.3 FDOT Experience Using Compost and Mulch.	3
1.4 Benefits of Utilizing Compost and Mulch	3
1.5 Use of Compost and Mulch by Other State DOTs.	4
2.0 Assessment of Experiences Using Mulch and Compost in Florida	5
2.1 Current FDOT Specifications for Mulch and Composting	5
2.2 Current and Potential Procurement and Usage of Organic Products	7
2.3 FDOT Staff and Contractors Experience.	10
3.0 State DOT Experience Applying Compost and Mulch.	13
3.1 Key Steps in Expanding Use of Compost and Mulch in State DOT Operations	13
3.2 Summary of Most Recent Science and Performance-Based Specs and BMPs Developed by Texas and California	16
3.3 Compilation of Education and Outreach Materials.	22
3.4 Profile of USCC Seal of Testing Assurance Program	27
4.0 Conclusion	31
4.1 Recommendations for FDOT to Increase Utilization of Compost and Mulch.	31

Appendices

- Appendix A - Project Summary / Acknowledgements
- Appendix B - January 14, 2009 FDOT Workshop Agenda
- Appendix C - Speaker Biographies and Presentations
- Appendix D - Case Study of Soft Armor Soil Stabilization on US Hwy 98, FDOT
- Appendix E - USCC Fact Sheet: Compost and Its Benefits



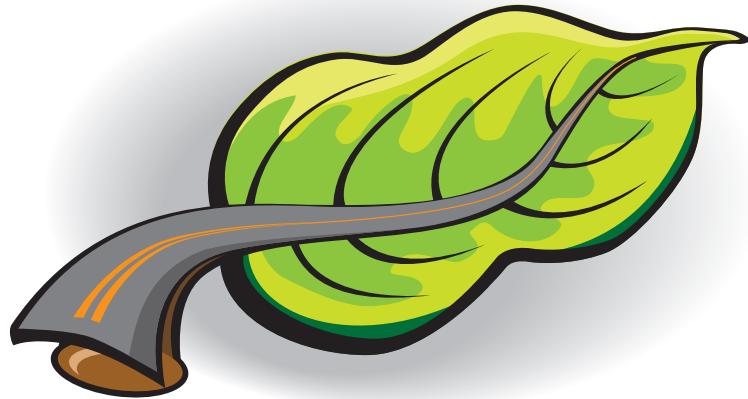
2002 Small Business Program Champion



EPA WasteWise Program Partner



Section 1.0



Introduction and Background

1.1 Introduction and Background

Each year, significant quantities of yard waste, and increasingly vegetative disaster debris, is generated and processed throughout Florida. In 2004 and 2005 Florida was devastated by seven hurricanes, resulting in 85 million cubic yards of disaster debris. Nearly 80 percent of the debris was vegetative. Once sized reduced in grinders at debris management sites, the majority of the material was recovered and beneficially used in applications such as mulch, compost, and as a soil amendment for agriculture. Since 1992, the state of Florida has banned the disposal of yard waste. This policy has led to the siting of dozens of municipal yard waste processing operations throughout the state, as well as an increasing number of private sector composting and mulching facilities.

The Florida Department of Transportation (FDOT) has the potential to serve a significant and important market for organic material generated from yard waste and vegetative

disaster debris. For FDOT to expand its utilization of compost and mulch, the material must be of high-quality, applied utilizing cost-effective technologies, and used in applications well suited to the properties and performance characteristics of mulch and compost. Ultimately, waste derived products such as mulch and compost can be widely used by FDOT to improve the performance and appearance of the state's transportation infrastructure, which in turn has spin-off benefits for Florida's economy and environment.

1.2 Goals and Objectives

The goal of this project is to expand the use of compost and mulch derived from yard waste and disaster debris in road construction and maintenance throughout Florida. To meet this objective, Sumter County, in partnership with Kessler Consulting, Inc. (KCI), is working with FDOT under a research grant project titled *Improved Markets for Beneficial Use of Storm Debris*.



As part of the project, significant research and analysis was completed on barriers and opportunities to increasing the application of compost and mulch in FDOT operations. The research included gathering feedback from FDOT officials and contractors on their experiences in applying compost and mulch, and the types of information and assistance that would enable expansion in the use of these materials in Florida. In addition, the strategies used by other state Departments of Transportations to institutionalize the utilization of compost and mulch were documented, including new or revised specifications, application techniques and quality control programs designed to facilitate the application of these products.

This marketing plan and guide is based on the results of this research. The guide is designed to provide FDOT officials and their contractors, information, resources, and tools that will lead to greater use of compost and mulch in future FDOT road construction and maintenance projects.

To equip FDOT officials with knowledge, resources and tools to increase the application of compost and mulch, the marketing plan covers the following key areas:

Current FDOT specifications for mulch and compost:

- Profiles existing FDOT specifications where mulch and compost could be incorporated. For each specification, potential applications within the specification for mulch and compost are described.

Current and potential procurement and usage of organic products:

- Estimates the amount of organic products purchased and utilized by FDOT in 2004 through 2006.

- Breaks down expenditures for each pay item section, including a tabulation of the quantity procured for each pay item in 2004 through 2006.
- Projects how much compost and mulch could be used by FDOT under modified specifications and practices.

FDOT and contractors experience using mulch and compost, and barriers and opportunities to increased use:

- Summarizes responses and findings from comprehensive survey of FDOT personnel and contractors.

Key steps to institutionalize use of compost/mulch by state DOTs:

- Highlights seven steps taken by other state DOTs to institutionalize the use of compost mulch throughout their state DOT operations.

Recent science and performance-based specs and BMPs developed by Caltrans, TxDOT and WSDOT:

- Summarizes three leading states' new science and performance-based specifications incorporating compost and mulch.

Compilation of best management practices (BMPs), outreach and education materials, technologies, and training manuals:

- Summarizes several guides, resources and tools designed to facilitate the use of compost and mulch in a variety of road construction and landscaping applications.

Profile of Seal of Testing Assurance Program:

- Provides details and enrollment requirements for the US Composting Council's program to test and certify the quality of compost and mulch.



Recommendations for FDOT to increase use of compost and mulch:

- Highlights programmatic steps, as well as science and technologies other states have used, to expand use of compost and mulch in road construction and maintenance.

13 FDOT Experience Using Compost and Mulch

Under this grant project, surveys were conducted of FDOT officials from construction, maintenance, and environmental staff from each district office, as well as road construction and maintenance contractors.

The purpose of the surveys was to determine FDOT staff and contractor experience with and usage of yard waste mulch and compost, and to identify barriers and opportunities for greater utilization.

An analysis of the responses provided the following overall survey findings:

- Application of compost and mulch is not currently widespread in the majority of FDOT districts.
- Of the various FDOT specifications in which compost and mulch could potentially be used, FDOT district officials are most experienced applying the materials in FDOT specification 580, *Landscape Installation*.
- The most significant barrier to utilizing mulch and compost on FDOT projects is quality control of the products, including performance and appearance.
- Specific areas of assistance identified to facilitate greater use of compost and mulch include programs to

ensure and certify the quality of mulch and compost, training workshops, educational materials, and potential new specifications directly incorporating mulch and compost.

In addition to these findings, the survey revealed that FDOT officials are generally not aware of extensive compost usage by other state DOTs such as Texas, California and Washington. Initiatives in these states to institutionalize the application of compost and mulch with DOT are featured in section 3 of this guide. More information on the results and findings from the FDOT staff and contractors survey is provided in section 2.2.

14 Benefits of Utilizing Compost and Mulch

The production of compost involves a process of controlled biological decomposition that reduces organic materials into a substance with high organic matter content, excellent water holding capacity, and a store of slow release nutrients. In addition to improving the chemical, physical, and biological characteristics of soil, composting also diverts organic waste from entering landfills and produces a valuable end product that can be used in a variety of applications, including highway construction and maintenance.

Figure 1-1 provides a list of the numerous benefits of applying compost and mulch.

Figure 1-1

Benefits of Compost and Mulch

- Decreases fertilizer and pesticide use
- Improves soil structure
- Reduces irrigation needs
- Establishes vegetation
- Increases soil productivity
- Controls erosion
- Stores carbon in the soil



1.5 Use of Compost and Mulch by Other State DOTs

Recognizing the numerous performance, environmental and economic benefits of using compost and mulch over the past several years, Departments of Transportation around the US have investigated and achieved positive results using compost and mulch products for such applications as turf and vegetative establishment, erosion control and landscaping.

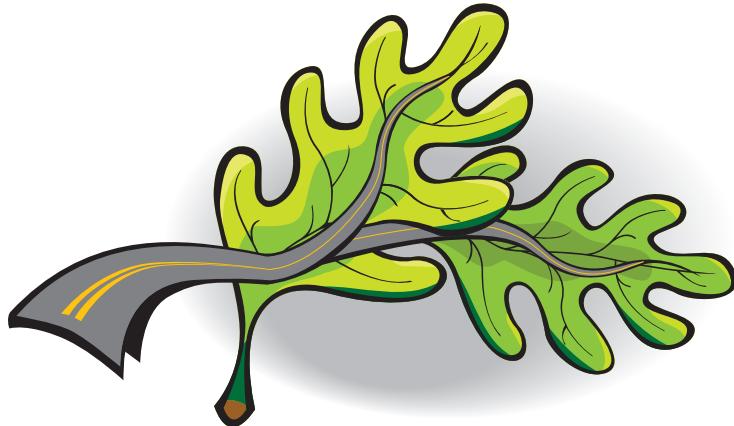
The US Environmental Protection Agency (EPA) has documented case studies of DOT experiences in applying compost in the following states:

- California DOT – Planting / Erosion Control
- Connecticut DOT – Landscape Plantings
- Connecticut DOT – Wetlands Creation
- Florida DOT – Turf Establishment
- Idaho Transportation Department – Vegetation Establishment
- New Hampshire DOT – Wildflower & Roadside Plantings
- Oregon DOT – Erosion Control
- Texas DOT – On Site Topsoil Manufacturing
- Texas DOT – Revegetating Difficult Slopes
- Virginia DOT – Wildflower Plantings
- Washington State DOT – Soil Bioengineering

More than 30 state DOTs currently have compost, or related product specifications. According to the US EPA, some states specify compost by name, while some allow it as an “approved equal” to other soil conditioners, and some specify its use through “special provisions.” After extensive use and testing, these special provisions often become official specifications. While some states only specify the use of specific types of compost, most states allow for the use of a variety of compost types. Of the more than 30 states specifying compost use, most focus on soil amending, including topsoil blending purposes, while several also specify compost for planting backfill mixes and, increasingly, for erosion control.

Some states have designed integrated, multi-partner programs to institutionalize the use of compost mulch throughout their state DOT operations. For example, the California Department of Transportation (Caltrans), the Texas Department of Transportation (TxDOT) and the Washington Department of Transportation (WSDOT) have developed and implemented programs that now utilize hundreds of thousands of cubic yards of compost and mulch in road construction and maintenance projects each year. The key steps these states have taken to establish and mainstream their programs are covered in section 3.1 of this guide. The path these states have taken to implement cost-effective strategies to increase the utilization of compost and mulch to improve vegetative growth and erosion control while reducing overall project costs provide a roadmap for FDOT to achieve the same benefits.

Section 2.0



Assessment of Experiences Using Mulch and Compost in Florida

2.1 Current FDOT Specifications for Mulch and Composting

The Standard Specifications for Road and Bridge Construction describes FDOT's requirements for all construction related to roadways and bridges managed by the FDOT. This document includes more than 100 sections. As part of this project, several existing FDOT specifications were identified as having the potential to incorporate mulch and compost. For each of the following sections, potential applications for mulch and compost are provided.

Section 104 Prevention, Control, and Abatement of Erosion and Water Pollution

Summary: This section includes the use of temporary erosion and water control features such as, temporary grassing, temporary sodding, temporary mulching (straw or hay mulch), berms, hay or straw bales, floating

turbidity barrier, staked turbidity barrier, and silt fence.

Potential Compost/Mulch Applications:

Specifications for these items could possibly be modified to permit usage of materials derived from mulch and compost. For example, soil bioengineering techniques can utilize fabric socks containing mulch and compost for erosion control, filtration, and silt removal.

Section 162 Prepared Soil Layer

Summary: This section includes three items: finish soil layer, organic soil layer, and blanket material. Specifications call for soil to have 2.5-10% organic matter content and 4.5-8.5 pH, which can be achieved by amending existing soils with organic material, compost, or commercially available soil amendment.

Potential Mulch/Compost Applications:

Native soils at construction sites may need amendment with compost, or imported soil





may be manufactured with compost, in order to meet the specifications.

Section 570 Performance Turf

Summary: In 2007 FDOT consolidated Sections 570 and 575 into a single Section, 570 Performance Turf, which addresses both methods of turf establishment (seeding and sodding). This section includes the establishment of growing healthy turf over all areas designated on the plans. The spec calls for the use of sod in areas designated on the plans to be sodded, and the use of seed, hydroseed, bonded fiber matrix, or sod in all other areas.

Potential Mulch/Compost Applications: Compost and mulch derived from yard waste may be used in place of traditional hay mulch. And new hydro-seeding techniques utilize fiber derived from yard waste. As currently written Section 570 effectively prohibits use of compost for fertilizing because fertilizer must comply with the state fertilizer rule and application requires a 16-4-8 NPK fertilizer which can only be met by chemical fertilizer. The potential exists to increase compost demand by modifying specs to top-dress established grass areas with compost and a method for fertilizing and soil improvement. Compost can also be used prior to placement of sod in order to increase the organic matter content, water holding capacity, and tilth of the soil. Additionally, compost may be used to top-dress established sod as a method of fertilizing and soil improvement.

Section 577 Shoulder Rework

Summary: This section covers landscaping and maintenance on road shoulders.

Potential Mulch/Compost Applications: Recent advancements in construction methods for shoulder rework utilize a method similar

to hydro-seeding and a material derived from yard waste compost and mulch. This new technology could be applied to cost-effectively increase the usage of compost and mulch.

Section 580 Landscape Installation

Summary: This section deals with planting of shrubs and trees.

Potential Mulch/Compost Applications: Compost can be used to amend native soils used for backfilling around the root ball. Specifications call for mulch around installed plants, which may be derived from yard waste. This section describes mulch as consisting of wood chips and straw, but does not specify yard waste materials. The potential exists to increase compost utilization by modifying the specification to encourage amending the native soil with compost prior to backfilling. This practice can be beneficial to plants, increase survival, and reduce watering requirements. It is also possible to utilize greater thickness of mulch after planting, which can also be beneficial to the plants.

Section 981 Turf Material

Summary: This section describes the types of seed, sod, and mulch that are acceptable for use in grassing and sodding. The specification defines mulch to be compost, hardwood barks, shavings, or chips; inorganic materials; or hydraulically applied wood fiber mulch or bonded fiber matrix.

Potential Mulch/Compost Applications: Currently, the most common FDOT use of mulch is for soil stabilization and erosion control over freshly seeded areas, for which hay and straw mulches are well suited. While compost is listed as an acceptable type of mulch material, yard waste mulch is not. Yet, yard waste mulch has been shown to be highly effective for bank stabilization



and erosion control. It may be possible to establish a separately specified yard waste mulch material that can be used for seeding and sodding work.

Section 982 Fertilizer

Summary: This section describes designations for fertilizers regarding minimum percentages of nitrogen, available phosphoric acid, and water-soluble potash contained in the fertilizer. At least 50% of the nitrogen should be from a slow-release source. All fertilizers must comply with the state fertilizer laws.

Potential Mulch/Compost Applications: Florida fertilizer laws effectively prohibit compost from being marketed with guaranteed fertilizer content (e.g., guaranteed minimum NPK) because fertilizer manufacturers pay a fee based on volume and nutrient content, which is prohibitively high for compost – a low nutrient high bulk commodity. Increasing FDOT demand for compost should be based on its comprehensive benefit to plants and soil, not solely its nutrient content. Instead of modifying this section to address compost, it may be more effective to incorporate compost into other material and method specifications.

Section 985 Geotextile Fabrics

Summary: This section instructs that geotextile fabrics shall be woven or non-woven fabrics that will allow the passage of water.

Potential Mulch/Compost Applications: A number of innovative geotextiles have been developed in recent years for erosion control and bank stabilization, some of which incorporate organic materials (generally referred to as “soil bioengineering”). However, this specification deals only with woven and non-woven fabrics. It may be possible to enhance markets for yard waste mulch and

compost by developing separate specs and design standards based on recent research and advances in soil bioengineering. For example, this might entail specifications for organic erosion control and stabilization materials and construction specifications for using them. It may also require development and testing of specific bioengineering products constructed with Florida yard waste mulch and compost, such as silt fences and erosion control blankets.

Section 987 Prepared Soil Layer Material

Summary: This section defines what compost is acceptable for FDOT projects. Compost shall meet FDEP Rule 62-709.550 requirements for Type Y, YM, or A compost, or Rule 62-640.850 requirements for Type AA compost. The prepared soil layer shall have an organic matter content of 2.5-10% and a pH of 4.5-8.5.

2.2 Current and Potential Procurement and Usage of Organic Products

FDOT Supply & Demand Data

Information regarding the amount of organic products purchased and utilized by FDOT in recent years was compiled by KCI and Sumter County. KCI analyzed FDOT Item Average Unit Cost spreadsheets for expenditures from 2004 through 2006. KCI compiled data according to section numbers and categories in FDOT’s Standard Specifications for Road and Bridge Construction that directly relates to the possible use of organics (i.e., mulch, compost, turf establishment, soil erosion, stabilization, and sedimentation control products). The following sections and



pay items were identified as pertaining to organics:

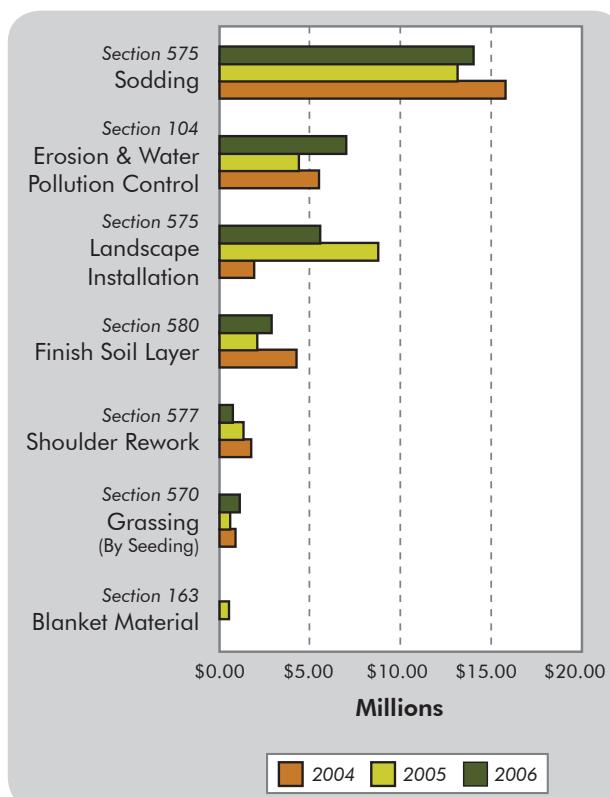
- Section 104 Prevention, Control, and Abatement of Erosion and Water Pollution
- Section 162 Finish Soil Layer
- Section 163 Blanket Material
- Section 570 Grassing - (Performance Turf)*
- Section 575 Sodding - (Performance Turf)*
- Section 577 Shoulder Rework
- Section 580 Landscape Installation

Figure 2-1 shows a breakdown of expenditures for each pay item section in 2004 through 2006. Expenditures for sodding and erosion control were significantly greater than for other items. Additionally, expenditures on landscape installation in 2005 were dramatically higher than in other years. It may be assumed that expenditures for landscape installation were greater in 2005 due to significant hurricane damage sustained by Florida in 2004 and 2005.

Table 2-1 summarizes the quantity procured for each pay item in 2004 through 2006. Again the quantity of sodding work performed for FDOT was significantly higher than other pay items. The annual average was approximately 4.66 million and 3.68 million square yards for general sodding and species-specific sodding, respectively. That equals approximately 1,720 square miles of sod each year.

On average over 3.9 million square yards (811 square miles) of finish soil layer were applied in Florida annually. Shoulder rework represented another major work activity averaging 1.1 million square yards annually

Figure 2-1:
Annual Expenditures for 2004 - 2006



(227 square miles). For each of those three categories, (sodding, finish soil layer, and shoulder rework) significantly more work was performed in 2004 than in 2005 or 2006, which again, might be related to repair of hurricane damage during those years.

After establishing the historical usage patterns summarized above, KCI estimated how much compost and mulch could be used by FDOT if it modified specifications and practices (see Table 2-2 below). Estimates in Table 2-2 are based on key assumptions regarding substitution of yard waste-derived mulch and compost for current materials and practices. The substitution assumptions include:

- Hay or Straw Bales: 25% of work is installed with 1.5-foot diameter filter socks filled with fibrous material derived from yard waste.

* In 2007, the FDOT implemented revised specifications that consolidated Sections 570 and 575 into a single Section 570 Performance Turf that addresses both methods of turf establishment (seeding and sodding).

Table 2-1:
Annual Quantities Procured for 2004 - 2006

Section & Pay Item	Unit of Measure	2004	2005	2006	Average
Section 104 Erosion & Water Pollution Control					
Hay or Straw Bale	each	768,935	364,302	325,315	486,184
Turbidity Barrier Staked	lineal feet	35,467	51,128	51,411	46,002
Silt Fence Staked (Type III)	lineal feet	2,776,787	2,282,683	2,926,843	2,662,104
Silt Fence Staked (Type IV)	lineal feet	9,724	292,458	106,220	136,134
Section 162 Finish Soil Layer					
Finish Soil Layer 6"	square yards	0	0	1,582,291	527,430
Finish Soil Layer 12"	square yards	0	0	1,174	391
Finish Soil Layer (Grassing OPR, 6")	square yards	5,914,470	3,296,427	958,834	3,389,911
Organic Soil Layer	square yards	24,241	2,870	0	9,037
Finish Soil Layer (Landscape Ops)	cubic yards	0	4,152	0	1,384
Section 163 Blanket Material					
Blanket Material (12")	square yards	65,583	0	0	21,861
Blanket Material (36")	square yards	0	6,697	0	2,232
Section 570 Grassing (By Seeding)					
Seeding	square yards	379,073	81,709	31,589	164,124
Seed and Mulch	square yards	2,063,291	1,748,349	2,119,206	1,976,949
Mulch Material	ton	1,391	1,686	1,979	1,686
Hydro-seeding	square yards	360,000	1,131	0	120,377
Section 575 Sodding					
Sodding	square yards	6,117,775	3,612,461	4,239,270	4,656,502
Sodding (Bahia)	square yards	4,340,202	1,359,052	1,007,889	2,235,714
Sodding (Centipede)	square yards	0	70,526	11,927	27,484
Sodding (Argentine Bahia)	square yards	406,507	691,271	54,608	384,129
Sodding (St. Augustine)	square yards	234,489	70,061	47,182	117,244
Sodding (Overlapped)	square yards	8,376	22	7,385	5,261
Sodding (Bermuda)	square yards	994,583	1,065,729	678,683	912,998
Section 577 Shoulder Rework					
Shoulder Rework	square yards	1,915,653	1,085,439	290,293	1,097,128
Section 580 Landscape Installation					
Landscape Complete (Small Plants)	no. of jobs	9	36	26	24
Landscape Complete (Large Plants)	no. of jobs	9	43	36	29



- Turbidity Barriers and Silt Fences: 25% of work is installed with structures that include 1.5-foot diameter filter socks filled with material derived from yard waste.
- Finish Soil Layer: 100% of work is performed using compost to amend native soil, with a 0.5 inch application to amend 6-inch soil layer, 1.0-inch application to amend 12-inch soil layer, and 2-inch application to establish organic soil layer.
- Blanket Material: 25% of work is installed using material that includes mulch/compost – 1-inch equivalent in 12-inch blanket and 2-inch equivalent in 36-inch blanket.
- Grassing and Sodding (Performance Turf): 50% of seeding work utilizes a 0.5-inch application of seed-compost mixture, and 50% of sod is grown on soils amended with 0.5-inch of compost between each sod harvest.
- Shoulder Rework: 100% of work includes a 0.5-inch application of seed-compost mixture.

Based on these assumptions, estimates of the amount of compost and mulch that could potentially be used in each section are provided in Table 2-2. Based on the above assumptions, KCI estimates that FDOT total usage of yard waste-derived compost and mulch could exceed 275,000 cubic yards per year. Because FDOT procurement records do not track the actual quantities of mulch and compost utilized, KCI was unable to document historical use and thus estimated how much potential new demand is represented by the 275,000 cubic yards per year.

2.3 FDOT Staff and Contractors Experience

To gather information data on the barriers and opportunities to increasing the use of compost, as well as recent experiences in applying these materials, KCI conducted on-line surveys of both FDOT personnel and contractors. Provided below are the findings from each survey.

FDOT Contractors Survey Results

An online survey was conducted of FDOT contractors to identify barriers to beneficial use of waste-derived compost and mulch. Florida Transportation Builders' Association (FTBA) members were encouraged to complete the survey. The first part of the survey focused on obtaining information on use of yard waste mulch and compost by FDOT contractors, while the second part of the survey targeted barriers to greater use of yard waste mulch and compost. An analysis of the responses from FDOT contractors provided the following survey findings:

Current usage of compost and mulch by FDOT contractors:

- Usage of mulch and compost derived from yard waste/storm debris is very limited.
- Nearly all respondents are aware of the new Performance Turf specifications.
- No respondents were aware of new methods for turf establishment that utilize compost and mulch.

Barriers to increased usage:

- A majority of respondents do not view FDOT specifications, design standards and project engineers as a barrier to usage generally.

Table 2-2:
Estimated Annual Potential Compost/Mulch Usage

Section & Pay Item	Unit of Measure	3-yr Avg	Compost/Mulch Substitution		Estimated Usage
			Percent	Rate	
Section 104 Erosion & Water Pollution Control					
Hay or Straw Bale	each	486,184	25%	0.20 cy	23,904
Turbidity Barrier Staked	lineal feet	46,002	25%	1.77 cf/lf	754
Silt Fence Staked (Type III)	lineal feet	2,662,104	25%	1.77 cf/lf	43,629
Silt Fence Staked (Type IV)	lineal feet	136,134	25%	1.77 cf/lf	2,231
Section 162 Finish Soil Layer					
Finish Soil Layer 6"	square yards	527,430	100%	0.5 inch	7,325
Finish Soil Layer 12"	square yards	391	100%	1 inch	11
Finish Soil Layer (Grassing OPR, 6")	square yards	3,389,911	100%	0.5 inch	47,082
Organic Soil Layer	square yards	9,037	100%	2 inch	502
Finish Soil Layer (Landscape Operation)	cubic yards	1,384	100%	5% organic matter	115
Section 163 Blanket Material					
Blanket Material (12")	square yards	21,861	25%	1 inch	607
Blanket Material (36")	square yards	2,232	25%	3 inch	186
Section 570 Grassing (By Seeding)					
Seeding	square yards	164,124	50%	0.5 inch	1,140
Seed and Mulch	square yards	1,976,949	50%	0.5 inch	13,729
Mulch Material	ton	1,686	50%	500 lb/cy	3,371
Hydro Seeding	square yards	120,377	50%	0.5 inch	836
Section 575 Sodding					
Sodding	square yards	4,656,502	50%	0.5 inch	64,674
Sodding (Bahia)	square yards	2,235,714	50%	0.5 inch	31,052
Sodding (Centipede)	square yards	27,484	50%	0.5 inch	382
Sodding (Argentine Bahia)	square yards	384,129	50%	0.5 inch	5,335
Sodding (St. Augustine)	square yards	117,244	50%	0.5 inch	1,628
Sodding (Overlapped)	square yards	5,261	50%	0.5 inch	73
Sodding (Bermuda)	square yards	912,998	50%	0.5 inch	12,681
Section 577 Shoulder Rework					
Shoulder Rework	square yards	1,097,128	100%	0.5 inch	15,238
Section 580 Landscape Installation					
Landscape Complete (Small Plants)	lump sum	24			
Landscape Complete (Large Plants)	lump sum	29			
Total Estimated Potential Compost/Mulch Usage					276,485



- According to the majority of respondents, specific requirements for erosion control structures do discourage or prevent usage of compost and mulch.
- A significant majority stated that they are able to find large quantities of mulch and compost.
- A majority stated that contamination is a problem, and a significant minority (42%) stated that materials handling and transportation problems discourage or prevent usage.
- The cost of mulch and compost was seen as a barrier by 50% of respondents.
- When asked to identify the most important barriers to greater usage, the lack of compost/mulch usage information was mentioned most often (64% of respondents), while product quality and proximity to job sites was mentioned by 55% of respondents.

Potential opportunities to increase usage:

- A majority of respondents (64%) said that training workshops and educational materials would help them to use more compost and mulch.
- None of the respondents were familiar with the FDOT/University of Florida's Institute of Food and Agricultural Sciences fact sheets regarding compost usage and application rates.

FDOT Personnel Survey Results

An on-line survey was conducted of FDOT officials from construction, maintenance, and environmental staff from each district office throughout Florida. The purpose of the surveys was to determine FDOT and contractor experience with mulch and compost and to identify opportunities and barriers to greater

utilization. An analysis of the responses provided the following survey findings:

Current usage of compost and mulch by FDOT Contractors:

- Very few past, present, and future FDOT district construction or maintenance projects utilize or plan to utilize compost and mulch.
- FDOT district officials are most familiar with usage of mulch and compost specification 580, Landscape Installation, and least familiar with Section 570, Performance Turf.
- Most FDOT officials have generally not specified yard waste mulch or compost use on FDOT projects.

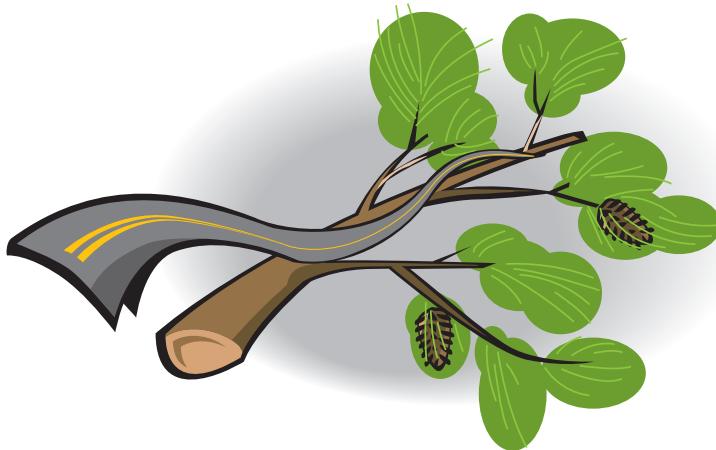
Barriers to increased usage:

- The biggest barrier to utilizing mulch and compost on FDOT projects is quality of material (appearance and contamination). Invasive weed seed and contamination of waterways were reported to be a large concern as well.

Potential opportunities to increase usage:

- FDOT district officials are unaware of extensive compost usage by other state DOTs (e.g., Texas, California and Washington).
- Most respondents feel that a training workshop and educational materials would be helpful to increase the use of compost and mulch in FDOT projects, including research and demonstrations.
- FDOT district officials expressed a need for clear definition of what yard waste mulch and compost truly is, as well as industry specifications and certification to ensure quality material.

Section 3.0



State DOT Experience Applying Compost and Mulch

3.1 Key Steps in Expanding Use of Compost and Mulch in State DOT Operations

This section highlights the key steps taken by two of the largest and most populous states to institutionalize the use of compost and mulch throughout their state DOT operations. The California Department of Transportation (Caltrans) and Texas Department of Transportation (TxDOT) have developed and implemented programs that now utilize hundreds of thousands of square yards of compost and mulch in road construction and maintenance projects each year. In addition to Caltrans and TxDOT, several other states have also substantially increased the utilization of compost and mulch. Select resources and information from these states are presented in section 3.3.

Caltrans and TxDOT have taken the following key steps to establish and mainstream their programs:

1. Develop partnerships and alliances

2. Set and define goals and objectives upfront
3. Conduct research and field trials
4. Revise specifications to incorporate compost and mulch
5. Establish system for ensuring and certifying the quality of compost and mulch products
6. Develop and deploy educational and outreach materials
7. Provide field training and convene workshops

Provided below are examples of how Caltrans and TxDOT applied these steps in implementing and sustaining their programs.

Step #1: Develop partnerships and alliance

As a first step in designing programs to expand the use of compost and mulch, state DOTs have reached out and partnered with



the following key organizations:

- State environmental agencies
- Quality assurance and certification programs
- Academic institutions
- Cooperative extensions
- Soil control and product testing laboratories
- Organic material vendors and consultants

Together these various stakeholders helped identify barriers to maximizing use of compost and mulch, and developed a set of revised compost specifications that resolved historic barriers to compost use including cost, availability and quality control.

For example, in 2005, Caltrans partnered with the California Integrated Waste Management Board (CIWMB), the University of California Riverside (UCR) Extension, the Association of Compost Producers (ACP), the US Composting Council (UCCC), UC Cooperative Extension, Filtrexx, and Soil Control Laboratories to identify and address the barriers preventing Caltrans from maximizing its use of compost. Working together, these various stakeholders developed a suite of compost specifications that facilitated a significant increase in usage.*

TxDOT worked with and received input from the Texas Natural Resource Conservation Commission (TNRCC), the Texas Transportation Institute (TTI), and the composting industry to revise specifications and build an environmentally sensitive transportation system while providing a much-needed market for organic waste.

* California Department of Transportation http://www.dot.ca.gov/hq/LandArch/policy/compost_specs.htm

Step #2:

Set and define goals and objectives upfront

Both DOTs worked with project partners to help define their goals and objectives for increasing the use of compost and mulch. Goals included:

- Reduction in material costs
- Improved quality control
- Decreased organic waste destined for disposal
- Higher performance and results in planting and erosion control measures

For example, according to CIWMB, **over 12 million tons of compostable materials were landfilled in California in**

2003. Caltrans and CIWMB felt that not only does this practice consume valuable landfill space, this disposal of compostable organics misses out on the contribution compost brings to improving soil structure and fertility, improving infiltration, reducing runoff, promoting healthy vegetation, reducing erosion, and improving water quality.

Step #3:

Conduct research and field trials

Research and field trials have proven that compost works effectively for erosion and sediment control and establishing vegetation. Composted organic material improves the chemical, physical, and biologic characteristics of soil on the vegetation growing media.

For example, TTI conducted a research study titled "The Use of Compost and Shredded Wood on Rights-of-Way," for TxDOT, TNRCC, and the Federal Highway



Administration (FHWA). The purpose of the study was to determine the performance of compost and shredded wood as erosion control materials for use on highway rights-of-way based on literature reviews and field tests. Results from this study demonstrated that the application of mulch (either compost or shredded wood) appears to be an effective erosion control method. Furthermore, findings proved that mulch can be used as a soil amendment to encourage the establishment of vegetation. Compost may also chemically bind some toxic substances, which suggests that it may have some application in bio-remediation.

Step #4:
Revise specifications to incorporate compost and mulch

A key step to mainstreaming the use of compost and mulch in DOT operations is to revise the specifications that incorporate and facilitate the use of the materials in road construction and maintenance projects. For example, Caltrans determined that lowering cost and improving quality control were the key objectives to revising the compost specifications, and were able to attain lower cost by utilizing waste derived compost and mulch. Section 3.3 provides additional information on how Caltrans and TxDOT revised their specifications.

Step #5:
Establish system for ensuring and certifying the quality of compost and mulch products

In order to expand the use of compost and mulch, DOTs will need assurances that the quality of the products is consistently

high. Both Caltrans and TxDOT adopted the US Composting Council's Seal of Quality Assurance program to certify that the compost and mulch suppliers are marketing high-quality products. For more information on this program, see section 3.4 of the guide.

Step #6:
Develop and deploy educational and outreach materials

Developing educational and outreach materials, such as best management guides that promote the application of compost and mulch in road construction and maintenance, is key to ensuring long-term sustainable programs. For example, to assist those involved with road construction and maintenance, Caltrans developed a series of BMPs and guides based on the revised specifications. More information on educational and outreach materials and resources developed by these DOTs is provided in section 3.3 of this guide.

Step #7:
Provide field training and convene workshops

The final step in institutionalizing the use of compost and mulch DOT operations is providing training in workshop and field settings to introduce new specifications and application techniques. Caltrans, in partnership with the CIWMB, held a series of six workshops statewide in 2006 to introduce these specifications to Caltrans designers and contractors, compost producers and other interested parties in city, county, or regional governmental agencies that might be interested.



3.2 Summary of Most Recent Science and Performance-Based Specs and BMPs Developed by Texas and California

To significantly expand the amount of mulch and compost used, both TxDOT and Caltrans developed new science and performance-based specifications that incorporated these products. These new specifications are summarized below.

California Department of Transportation Revised Specifications

A key goal of Caltrans revised specifications was to reduce the costs of utilizing compost and mulch. Recent research by Caltrans indicated that successful establishment of permanent vegetation in disturbed soils is greatly enhanced through the use of moderate amounts of compost in the revegetation work. The research clearly demonstrated the contribution of compost to vegetation establishment, erosion control, and storm water pollution prevention. Cost, however, had been a major roadblock to Caltrans increasing its use of compost. The average cost to Caltrans for applied compost had exceeded \$300/cubic yard. A number of factors contributed to this high cost, but the most significant was application technique. Caltrans contractors typically applied compost, together with seed, water and fiber, through a 3/8-inch-diameter nozzle pressurized by a hydroseeding truck. While hydroseeding can efficiently apply compost up to a 1/64-inch-thick layer, applying larger volumes cost effectively requires revised application techniques and consequently new



erosion control specifications. One method tested compost application using a snow blower attachment. The demonstration was a success, applying compost evenly on the slope and at a much more rapid rate than a hydroseed blower truck.*

Considering that other state DOTs and researchers typically recommend compost applications ranging from 1- to 3-inches deep, Caltrans had to develop specifications

(Erosion Control Compost Blanket, see below) that facilitated new application techniques. The agency also revised existing specifications (Erosion Control Type C, Type D, and Drill Seed, see below) to allow the use of bulk as well as bagged compost products. Contractors estimated that allowing bulk compost products should bring the average unit price for compost down from \$300/cubic yard to \$30–\$40/cubic yard, enabling Caltrans to apply up to ten times more compost for the same total price.

Table 3-1 compares Caltrans old specifications to the revised specifications, and shows how the agency's revised specifications lowered costs and improved quality.

Compost Related Erosion Control Specifications

Provided below is information on Caltrans revised compost related erosion control specifications. For more information on Caltrans, and for a complete list of their specifications, see: http://www.dot.ca.gov/hq/LandArch/policy/compost_specs.htm

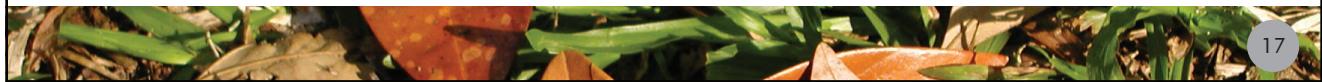
* "California Agencies Partner to Increase Compost Use on Roadsides." Brian Larimore and Gregory Balzer, BioCycle, March 2007, Vol. 48, No. 3, p. 29

Table 3-1:
Caltrans Old Specifications to Revised Specifications

Goals	Old Specifications	New/Revised Compost Material Specifications
Lower Costs	Previous cost of applied compost \$300/CY High price due to utilizing bagged material Application methods such as hydroseeding	Switched to bulk material Utilize alternative application methods such as bulldozer, slinger spreader, and snow blower
Improve Quality Control	Contractor performed solvita test (for maturity) in the field Contractor then submitted results to the systems engineer	Now compost producer submits samples to Seal of Testing Assurance Program (STA) lab Samples tested via STA methodologies Results returned to compost facility Paperwork submitted by contractor <ul style="list-style-type: none"> • Compost lab test results • Certificate of Compliance • Compost Technical Data Sheets (CTDS) Tests for maturity, pH, soluble salts, stability, pathogens, stability, phytotoxicity, particle size, physical contaminants, and heavy metals

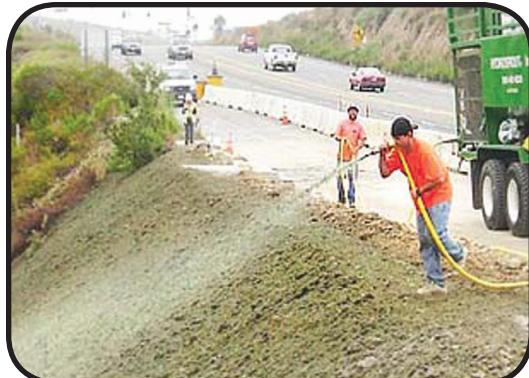
Erosion Control (Type C)

Erosion Control (Type C) work includes applying seed, fiber, stabilizing emulsion (glue), straw, and compost to "fill" slopes. The seed, fiber and stabilizing emulsion are typically mixed in a slurry with water and applied from a hose attached to a hydroseed truck. Compost can either be applied together with the other materials in the slurry, or it can be dry-applied as a separate step in the process. While a separate dry application of compost has a higher labor cost, the material cost of the dry (bulk) compost can be up to 1/10th the cost of the bagged compost required for hydroseed application.



Erosion Control (Type D)

Erosion Control (Type D) work includes applying seed, fiber, stabilizing emulsion (glue), and compost to "cut" or "fill" slopes. The seed, fiber and stabilizing emulsion are typically mixed in a slurry with water and applied from a hose attached to a hydroseed truck. Compost can either be applied together with the other materials in the slurry, or it can be dry-applied as a separate step in the process. While a separate dry application of compost has a higher labor cost, the material cost of the dry (bulk) compost can be up to 1/10th the cost of the bagged compost required for hydroseed application.



Erosion Control (Drill Seed)

Erosion Control (Drill Seed) work includes placing seed in the soil with a drill seeding device similar to that used by farmers to plant agricultural crops. Placing the seed in the soil offers greater protection from the sun, wind, birds and like items that inhibit seed germination. To help improve soil fertility, and reduce erosion by high winds and rainfall, this specification asks that a thin layer of compost and stabilizing emulsion (glue) be applied to the soil surface after the drill seeding work is complete.





Erosion Control (Compost Blanket)

Erosion Control (Compost Blanket) work involves placing a thin layer of coarse compost to an area, and then applying the seed via hydroseeding or dry/hand application. If applied via hydroseed, fiber and stabilizing emulsion (glue) are to be applied as well. The compost protects the seed from the elements - promoting germination, provides nutrients to enrich the soil, and acts as a mulch - reducing competition from annual weed species, reducing storm water runoff, and helping conserve soil moisture.



Compost (Incorporate)

Compost (Incorporate) work involves incorporating 3-4 inches of coarse compost to a depth of 12-18 inches (roughly 30% by volume) in disturbed areas that are intended to receive planting to control erosion. The organic materials provided by the compost help improve soil structure and fertility, leading to improved infiltration, increased water holding capacity, and reduced storm water runoff.



Soil Amendment

The revised Soil Amendment SSP requires soil amendment used on Caltrans projects to be compost produced from the following feed stocks: green material, biosolids, manure or mixed food waste, and meet the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7.



Mulch

The revised Mulch spec still allows the designer to select and specify mulch from a list of materials including green material, tree bark, wood chips, and shredded bark; however the revised spec requires green material mulch be produced by a compost producer that belongs to the US Composting Council (USCC) Seal of Testing Authority (STA) program, as well as compost materials in conformance with Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7. Composting green material used as mulch will help ensure that mulch is free of harmful pollutants, pathogens and weed seed.



Texas Department of Transportation (TxDOT) Recycled Content

Compost Purchases and Revised Specifications

TxDOT is a leader in the use of recycled materials, including compost, throughout their operations. Table 3-2 provides a breakdown of the quantities and dollar amounts of the various recycled materials purchased by TxDOT in FY 08.

In FY08, TxDOT and its contractors utilized 331,000 cubic yards of compost in road construction and maintenance projects. An important factor in the significant level of usage was the application of specifications that specifically incorporate compost and mulch.

Following is a summary of the key elements of TxDOT specifications for compost and mulch.

- Compost manufactured topsoil (CMT) can be blended on-site into topsoil that is salvaged from excavation and embankment areas; blended in place by applying compost in a uniform layer and incorporating the material into the existing in-place topsoil; or pre-blended in a mix of 75 percent topsoil and 25 percent compost. The compost manufactured topsoil is then applied in a uniform layer to the depths shown on the project plans.
- Erosion control compost is used after excavation



and embankment work is complete and applied in a 2" uniform layer. Erosion control compost can be utilized on slopes of 3:1 and generally at a depth of 2."

- General use compost is used for top-dressing for established turf.
- Filter berms made from 50 percent compost and 50 percent wood chips, as well as 100 percent wood chips can also be used.

**Table 3-2:
Summary of TxDOT Recycled Material Usage in FY08**

Roadway Recycled Materials and Products Placed

331,000 cubic yards	Compost
695,000 tons	Recycled Concrete Aggregate
272,000 tons	Fly Ash
9,450 tons	Glass Traffic Beads
12,200 tons	Crumb Rubber
3,430 tons	Cellulose Fiber Mulch

Purchases of Recycled-Content Products

\$13.8 million	Compost Products
\$9.5 million	Glass Traffic Beads
\$4.6 million	Printing and Writing Paper
\$2.5 million	Re-Refined Motor Oils and Lubricants
\$2.2 million	Cellulose Fiber Mulch
\$574,000	Remanufactured Toner Cartridges
\$789,000	Flexible Delineator Posts
\$358,000	Paper Towels and Tissues

Source: http://www.txdot.gov/services/general_services/recycling/performance.htm



3.3 Compilation of Education & Outreach Materials

Provided below are summaries of several guides, resources and tools designed to facilitate the use of compost and mulch in a variety of road construction and landscaping applications from the following states: California, Texas, and Washington.

To access the documents via the web, please click on the hyperlink provided below each document description.

CALIFORNIA RESOURCES

Compost Use for Landscape and Environmental Enhancement

California Integrated Waste Management Board (CIWMB), June 2007

This manual is intended to provide objective information regarding compost use in landscape plantings and environmental applications to public and private decision makers, purchasers, installers, and other interested parties. Guidance for distinguishing quality compost is included, along with parameters for matching compost products with various uses. Until a few years ago, compost customers could expect little technical guidance from experts beyond the warning, "buyer beware." Fortunately, due to major advances in compost technology and standardization by research scientists and engineers that are currently being implemented by the compost industry, consistently higher quality composts for a wide range of applications are available.

Compost Use for Erosion Control

Karin Grobe, Erosion Control, May-June, 2006

Compost, an erosion control material that enhances soil and is made from readily available, inexpensive materials, is gaining ground as an accepted material for erosion control and roadside landscaping in California. Construction projects typically degrade and compact soil, causing breakdown of aggregates and loss of structure.

California Agencies Partner to Increase Compost Use on Roadsides

Brian Larimore and Gregory Balzer, BioCycle, March 2007, Vol. 48, No. 3, p. 29

A partnership between Caltrans, the CIWMB, university extension offices, a state composting group and private industry is expected to dramatically boost the use of compost on highway roadsides.

Compost and Tillage for Plant Establishment: Researching Plots in San Jose

Karin Grobe, Erosion Control, March/April 2007

This article is about producing sustainable roadside vegetation by amending the existing disturbed soil structure by adding compost. Vic Claassen, a soil scientist with the University of California–Davis Department of Land, Air, and Water Resources, is researching the effect of compost and tillage on plant establishment and growth in degraded roadside soils. Researchers from his soils and revegetation lab are gathering information on the potential for establishment of California native shrubs and grasses in arid climates without the aid of irrigation systems.



Hardscaping with Caltrans – Techniques in Reducing Herbicide Use

Kerry L. Clines, Better Roads Magazine, April 2006

In response to the Environmental Impact Report, Caltrans adopted an integrated vegetation management program and set goals for the reduction of herbicide use - 50% reduction by 2000 and 80% reduction by 2012. California tests new vegetation-control methods for those hard-to-manage areas along roadsides.

Snowblowers in Summer?

Doug Brown, Caltrans News, February 2006

Caltrans is pioneering a unique and unexpected application for its snow-blowing equipment - using it to distribute compost to roadside areas.

TEXAS RESOURCES

Golden Compost

EPA GreenScapes – Environmentally Beneficial Landscaping

EPA profile of TxDOT compost usage program recognized as one of the most advanced, widespread compost-use programs in the United States and has conducted more than 20 demonstrations across the state proving the benefits of compost.

Compost and Shredded Brush

Texas Department of Transportation (TxDOT)

As part of the TxDOT Road to Recycling initiative, a road construction industry panel identified materials with great potential in road construction that are readily available in Texas in potentially large volumes, offer engineering benefits, cost-effective pricing and no increased environmental risks. This packet provides information about how and why to use compost in roadway construction and maintenance projects. The packets include a material overview, research summaries, case studies, a list of current specifications, a list of material sources and a summary of experiences with the material.

Contractor's Checklist

Texas Department of Transportation (TxDOT)

This form is applicable to wholly state or locally funded contracts administered by the department for determining if reduced retainage applies to the contract. Complete and submit this form, in accordance with contract provisions and DMS-11000, for each contract where the contractor supplied any of the nonhazardous recycled materials (NRMs) listed below. Submit this form to the Area Engineer **prior** to the beginning of time charges or work (including accumulation of materials on hand), whichever occurs first.



Contractor's Environmental Certification

Texas Department of Transportation (TxDOT)

This report must be completed and submitted for each project to certify that one or more sealed nonhazardous recycled material products meet contract provisions.

Supplier/Producer Environmental Certification

Texas Department of Transportation (TxDOT)

This report must be completed for each nonhazardous recycled material reported and provide to contractor.

Evaluating and Using Nonhazardous Recyclable Material Guidelines

Texas Department of Transportation (TxDOT), October 2008

This specification governs the process for evaluating the environmental factors associated with nonhazardous recyclable materials (NRMs) not addressed in other Department specifications. Applicable Department engineering specifications govern the evaluation of engineering factors associated with the NRM product. The Department's goal is to use materials with environmental qualities that do not necessitate short-term or long-term management (i.e., worker protection, deed restrictions, tracking, monitoring, or special handling after the project life) in Department specification items.

Recycled Materials Mapping System

Texas Department of Transportation (TxDOT)

The Recycled Materials Mapping System allows you to query for facilities that generate or process a specific recycled material such as, concrete, ceramic, glass, etc. Information about the facility is given so you can contact the facility directly.

Use of Compost and Shredded Wood on Rights of Way

Texas Department of Transportation (TxDOT)

The Texas Transportation Institute (TTI) conducted study 0-1352, "The Use of Compost and Shredded Wood on Rights-of-Way," for TxDOT, the Texas Commission on Environmental Quality (TCEQ), and the Federal Highway Administration (FHWA). The purpose of the study was to determine the performance of compost and shredded wood as erosion control materials for use on highway rights-of-way based on literature reviews and field tests.

WASHINGTON STATE RESOURCES

Standard Specifications 2008

Washington State Department of Transportation, 2008

Compost special provisions are useful when amending the standard specifications. Refer to Section 9-14 Erosion Control and Roadside Planting.



The Highway Runoff Manual

Washington State Department of Transportation, June 2008

The Highway Runoff Manual (HRM) provides guidance to direct the planning and design of stormwater management facilities for existing and new Washington state highways, rest areas, park-and-ride lots, ferry terminals, and highway maintenance facilities throughout the state. The HRM establishes minimum requirements and provides uniform technical guidance.

Stormwater Research Website

Washington State Department of Transportation

The WSDOT Stormwater Research website is a valuable resource for research conducted on state-of-the-art, cost-effective solutions for designing, constructing, and maintaining stormwater management systems.

Compost Amended Vegetated Filter Strip Performance Monitoring Project

Washington State Department of Transportation, February 2007

The Washington State Department of Transportation (WSDOT) received research funds in 2003 from the Federal Highway Administration (FHWA) to install and document the flow control effectiveness of one low-impact development (LID) technique with potential application as a best management practice (BMP) for stormwater in urban environments.

A Case Study of Benefit-Cost Analysis: Soil Bioengineering as an Alternative for Roadside Management

Washington State Department of Transportation, June 2001

This case study applied a benefit-cost analysis to an experimental soil bioengineering demonstration project to determine whether it is indeed an economically efficient alternative to traditional roadside management.

WSDOT Roadside Manual Chapter 740-Soil Bioengineering

Washington State Department of Transportation, September 2000

This practical guide covers definitions, planning, design, implementation, site evaluation, and eleven upland soil bioengineering techniques. This guide is similar to the US Forest Service guide, but gives WSDOT-specific information.

Soil Bioengineering for Upland Slope Stabilization Research Report

Washington State Department of Transportation, February 2001

The objective of the study was to provide alternatives called soil bioengineering methods for slope and shallow rapid landslide stabilization along different roadside environments. Additional objectives were to educate WSDOT personnel in site selection, soil bioengineering techniques, construction and to provide soil bioengineering decision-making skills.



Building Soils for Storm Water Compliance and Successful Landscapes

Biocycle, March 2007

Showcases research, regulations, innovative projects and professional outreach to make the soil-water connection in Washington.

Construction Site Erosion and Sediment Control Certification Course

Washington State Department of Transportation (WSDOT)

Contractor's staff seeking certification to perform ESC Lead activities must receive training from an *Ecology approved training provider*. Ecology required classes are two days long, one in-class day followed by a day in the field installing BMPs. Participants will understand the framework under which construction activities are regulated (e.g. Clean Water Act & Endangered Species Act), the factors affecting soil erodibility, proper erosion/sediment control Best Management Practice (BMP) usage, and the TESC planning process.

ADDITIONAL RESOURCES

USCC Fact Sheet

United States Composting Council

Increased runoff leads to increased erosion, more frequent and more intense flooding, habitat and species loss, higher pollutant loads, and water quality degradation. While the emphasis in stormwater management over the past 50 years has been on "peak rate" control, that is, detaining stormwater so that the highest rate

of flow was no more than what would have been expected before the development (hence the ubiquitous detention basins in modern landscapes), there is a paradigm shift underway that recognizes that the most effective storm water management will be one that attempts to emulate natural processes. Thus management practices that emphasize the roles of soils and plants are gaining prominence. These practices are enhanced, and often even depend, on the incorporation of good quality compost into the practice.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas

EPA, November 2005

This management measure is intended to reduce the amount of sediment generated from construction sites (erosion control) and reduce the off-site transport of sediment and construction-related chemicals (sediment and chemical control). This measure is intended to work in concert with the Watershed Protection, New Development Runoff Treatment, and Site Development Management Measures in a comprehensive watershed management program framework.

Compost and Storm Water Management—Tapping the Potential

Nora Goldstein, Biocycle, August 2002

An EPA storm water management rule for smaller municipalities and construction sites becomes effective in March 2003. Compost fits a Best Management Practice—but regulators and the regulated community need to learn why and how.

Compost Use on State Highway Applications

Environmental Protection Agency (EPA), The Composting Council Research and Education Foundation (CCREF), United States Composting Council (USCC)

Funded by EPA, the CCREF, in conjunction with the USCC, developed this document to promote compost use on state and local 'roadside' applications. Its goal is to provide individuals and organizations - roads and highways staff, policy makers, product specifiers, project designers and engineers, environmental officers, landscapers, and other interested parties - involved in the maintenance and management of roadsides and highways, with the tools necessary to use composted products to meet their specific project requirements.

Soil Bioengineering An Alternative to Roadside Management

USDA Forest Service, September 2000

A practical guide by Lisa Lewis, US Forest Service. This guide covers basic soil bioengineering concepts. It includes a site evaluation and design, planning, and implementation checklist. It covers twelve different upland techniques.

3.4 Profile of USCC's Seal of Testing Assurance Program

Based on the findings from surveys of both FDOT officials and the agency's contractors, a top barrier to increased utilization of compost and mulch is lack of standards and testing to ensure that compost and mulch meet performance and quality standards. To address the issue of quality control and assurance, Caltrans, TxDOT and WSDOT have all adopted the US Composting Council's (USCC) Seal of Testing Assurance Program (STA) program to certify that the compost and mulch suppliers are marketing high-quality products.

Currently, one company in Florida is participating in the STA program, but numerous facilities are certified in Texas, California and Washington, demonstrating that a sustained commitment to purchase compost and mulch by state DOTs increases the quality and availability of these products.

Provided below is a profile of the USCC's STA program.



Program Overview

The USCC STA is a compost testing, labeling and information disclosure program designed to ensure the maximum benefit from the use of compost. The program was created in 2000 and is the consensus of many of the leading compost research scientists in the United States.

The science behind the development of the STA Program and the various tests that are used is contained in 'Test Methods for



the Examination of Composting & Compost' (TMECC). This publication includes a suite of physical, chemical and biological tests. These were selected to help both compost producer and purchaser to determine if the compost they are considering is suitable for the use that they are planning, and to help them compare various compost products using a testing program that can be performed by a group of independent, certified labs across the country and in Canada.

Key Elements of the STA Program

- All enrolled manufacturers or marketers (Participants) will regularly sample and test their compost products based on production volumes, or as otherwise prescribed by the STA program administrators for each facility they enroll
- Participants will complete test analyses for the compost properties listed below. Also, any and all testing required by applicable state and/or federal regulation (e.g., pathogens, heavy metals, pesticides, inerts, etc.) to assure public health/safety and environmental protection must be completed at the frequency so regulated. It is not necessary to provide laboratory analysis for particle size. The participant must report the screen size in which the product passes during screening.
- All lab analyses will be conducted at 'approved laboratories' which have certified that they are capable of performing the test methods specified in the Program Rules.
- The Participants, or their compost testing lab, will provide the appropriate lab analyses results (and updated Compost Technical Data Sheet) to the USCC at the prescribed frequency. This data will not be distributed to compost customers by the USCC. This responsibility lies solely with the program Participants.
- All Participants will make test results available to any person, upon request, using the STA Program's "Compost Technical Data Sheet." The Compost Technical Data Sheet includes directions for product use, a list of product ingredients and analytical test results. The USCC will not assess whether or not, or to what extent, these directions are appropriate; this is solely the responsibility of the Participant.
- A Participant's composting facility must certify that it is in compliance with all applicable local, state, and federal regulations with respect to the certified compost product(s) and it must remain compliant to remain in the STA Program.
- The USCC will certify an applicant's compost product on the basis of the criteria specified in the "Program Rules", allowing Program involvement with respect to the approved product, and use of the STA Program Logo, promotional opportunities, etc. If a compost manufacturer or marketer represents multiple facilities, the compost product from each individual facility requires separate enrollment in the Program. Where more than one compost product (significantly varied



feedstocks) is produced at a given facility, each individual compost product must be enrolled in the Program. However, products that are simply re-screened or further aged (cured) to produce additional products are not required to be enrolled separately.

- Participants pay an annual STA Program application fee of \$650 per product. Participants who are USCC members receive an application fee discount of \$150 per product (\$500).
- Participants have the right to use the STA Program Logo in their promotional activities, with respect to certified compost product(s), as long as they stay compliant with the program rules.

Required Customer Information

The following information is placed on the product bag or literature, or by using the Seal of Testing Assurance's Compost Technical Data Sheet:

The Seal of Testing Assurance logo, accompanied by the following written statement:

"This compost product has been sampled and tested as required by the Seal of Testing Assurance Program of the United States Composting Council (USCC). Test results are available upon request by calling (Licensee Name) at (Telephone Number). The USCC makes no warranties regarding this product or its contents, quality, or suitability for any particular use."

Testing

Certified compost products are analyzed for the following properties

- pH
- soluble salts
- nutrient content (total N, P₂O₅, K₂O, Ca, Mg)
- moisture content
- organic matter content
- bioassay (maturity)
- stability (respirometry)
- particle size (report only)
- pathogen (Fecal Coliform or Salmonella)
- trace metals (Part 503 regulated metals)

For more information on the STA program, contact the Administrative/Technical Manager:

Al Rattie

29 E. Ridge Avenue

Sellersville, PA 18960

215-258-5259

Arconsulting1@verizon..net

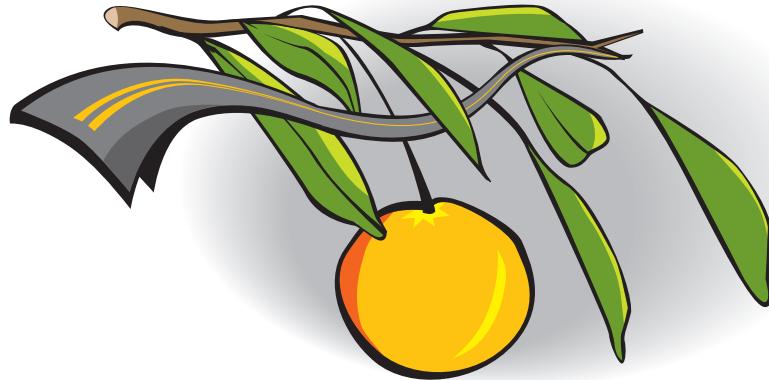
www.compostingcouncil.org





Notes

Section 40



Conclusion

4.1 Recommendations for FDOT to Increase Utilization of Compost and Mulch

This marketing plan and guide is designed to provide FDOT officials, and their contractors, information, resources and tools that will lead to greater use of compost and mulch in future road construction and maintenance projects.

Through the state's existing ban on yard waste disposal, coupled with the enormous amounts of vegetative debris generated from tropical systems, communities and industries throughout Florida manage substantial quantities of organic materials suitable for use as compost and mulch. While the infrastructure to turn these organic materials into high-quality, valued-added products is expanding, a key ingredient to inciting further growth is lacking: namely, a long-term commitment from a large potential user such as FDOT. As demonstrated by the experiences in Texas, California and Washington, commitment

from state transportation agencies to utilize these products spurs the expansion of facilities capable of producing quality compost and mulch. Commitments by these state DOTs have resulted in win-wins for the agencies: the products enhance vegetative growth, prevent soil erosion, limit stormwater pollution and save substantial dollars on project costs.

While individual districts and contractors can take important steps to increase the amount of compost and mulch utilized in specific construction and maintenance projects, in order to achieve an agency-wide win-win and drive expansion in the availability and quality of these products throughout Florida, key staff within FDOT will need to take leadership roles in spearheading the changes required to institutionalize the use of the materials.

The experiences of California, Florida and Washington provide a roadmap for FDOT leaders. Based on the notable successes in these states, the project team recommends



that FDOT take the following steps to facilitate the expansion of compost and mulch utilization:

- Create partnerships with state environmental protection agencies, local governments processing yard waste and vegetative storm debris, academic and research institutions, product testing labs and quality assurance organizations.

There are numerous organizations within Florida and nationally that FDOT can create strategic alliances with to facilitate expansion in the utilization of compost and mulch. Critical to increasing the use of compost and mulch is a strong working relationship between the state department of transportation and state level environmental agencies. In Florida, the Department of Environmental Protection (DEP) regulates composting facilities, and provides education and technical assistance to increase beneficial use of organic materials. The DEP also maintains a list of permitted yard waste and composting facilities (see: http://www.dep.state.fl.us/waste/categories/solid_waste/pages/composting.htm). It will be important for FDOT to reach out to DEP leadership and develop a coordinated plan to expand the infrastructure for producing high-quality compost and mulch throughout Florida.

There are 260 yard waste processing facilities operated by local governments throughout Florida. In addition, during clean-up operations after storms, these same local governments operate numerous temporary debris management sites to process vegetative debris into mulch. Given the geographic spread of these facilities throughout the state, as FDOT seeks to expand utilization of compost and mulch, local governments are logical partners. FDOT district staff

can develop relationships with public works departments and recycling managers in communities within their jurisdictions and explore opportunities to source compost and mulch directly from local government yard waste processing facilities and disaster debris management operations. In addition, FDOT can work with the local governments to utilize third-party contractors or composting facilities to upgrade municipally generated organic material to quality levels required for use by FDOT in road construction and maintenance.

State DOTs have also worked closely with academic institutions to develop science-based specifications and case studies. FDOT can continue and expand its work with the University of Florida's Institute of Food and Agricultural Sciences to direct university staff to conduct new field trials using compost, as well as assist in developing protocols for testing water quality of stormwater runoff within projects utilizing compost and mulch.

- Set and define objectives upfront to increase the utilization of compost mulch.

FDOT leadership and district staff, including landscape and environment engineers, can form a team to spearhead the overall initiative to increase use of compost and mulch. One key role of this team will be to establish goals and objectives up front, such as reduction in material costs, higher performance and results in planting and erosion control measures, and decreases in the amount of organic waste destined for disposal. Setting goals based on quantitative measures can provide benchmarks on which to measure progress throughout the initiative.

- Conduct research and field trials to demonstrate that compost works effectively for erosion and sediment control and establishing vegetation.



While surveys conducted as part of the project show that the utilization of compost and mulch is not widespread within FDOT operations, a limited number of projects are utilizing these materials. This provides an opportunity for FDOT to develop approaches to systematically document through case studies the performance and cost of these projects compared with utilization of traditional seeding and erosion control techniques. To build a system to track experience with utilizing compost and mulch, FDOT can request that contractors utilizing these materials provide documentation of the performance of these materials, the applications techniques utilized, and the square yard costs to apply compost and mulch.

- Revise specifications dealing with compost and mulch use, and establish a system for ensuring and certifying the quality of compost and mulch products such as the USCC STA program.

States that have significantly expanded utilization of compost and mulch have conducted comprehensive evaluations of their specifications to determine if current specifications present barriers to utilization, and then revised specifications to facilitate usage. Section 3.2 documents how Caltrans revised their specifications to reduce the cost of applying compost by broadening the application methods beyond hydroseeding. Within FDOT, the potential exists to increase compost demand by modifying specs. Section 2.1 details specific recommendations for how compost and mulch can be incorporated within existing specs, such as by permitting the use of compost to top-dress established grass areas as a method for fertilizing and soil improvement. In revising specifications, state DOTs have in many cases added language within specifications identifying specific

applications for compost and mulch that will meet the requirements of the specification.

To establish standards and testing to ensure that compost and mulch meet performance and quality standards, FDOT can follow the lead of Caltrans, TxDOT and WSDOT, as well as numerous other state DOTs, and adopt the USCC's Seal of Testing Assurance Program to certify that the compost and mulch suppliers are marketing high-quality product. While there is currently only one supplier within Florida certified by the STA program, a sustained commitment to purchase compost and mulch by FDOT will increase the quality and availability of these products from suppliers within Florida.

- Develop educational and outreach materials such as best management practices guides that promote the application of compost and mulch in road construction and maintenance, provide ongoing training in workshop and field settings to introduce new specifications and application techniques.

As a key element of this project, numerous resources were compiled in Section 3.3, including several recent guides and manuals developed by state DOTs to provide training and BMPs for applying mulch and compost. While each state is different in terms of climate, demographics, and road construction and maintenance priorities, these resources have application for FDOT. FDOT can review each of these resources, and determine how the information and lessons learned can be applied to Florida. These resources can also serve as the basis for developing training manuals specifically for FDOT personnel and contractors.

This marketing plan is designed to provide a sound and informed basis for FDOT staff to





formulate a strategic plan to institutionalize the use of compost and mulch within their operations. As a first step in implementing this plan and providing training to FDOT personnel on the benefits and application methods for compost and mulch, FDOT is hosting a webinar in January 2009. The webinar will provide an opportunity for FDOT personnel to meet with their peers from other state departments of transportation to share information on the most effective and economical strategies for expanding the use of compost and mulch in road construction and maintenance. The event will feature presentations from the Texas Department of Transportation and the Washington State Department of Transportation. The webinar is a key first step in providing training and information exchange to FDOT officials on successful approaches other states have used to facilitate the expansion in compost and mulch utilization. Following the webinar, FDOT can devise a long-term plan to develop educational and outreach materials, and provide ongoing hands-on training in both workshop and field settings.

Appendices





Appendix A





Appendix B



Appendix C





Appendix D



Appendix E

