



Using Compost to Improve Erosion Control and Highway Planting

Caltrans Office of Roadside Management
& Landscape Architecture Standards

Highway Planting & EC



Why?



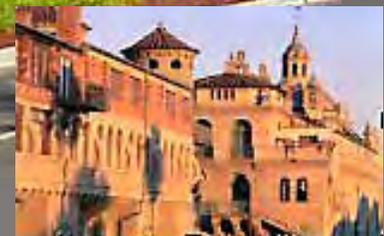
Why Highway Planting & EC?

- Safety
 - Headlight Glare Screen
 - Roadway Delineation
 - Fire Suppression
 - Wind Breaks



Why Highway Planting & EC?

- Aesthetics (Project Fit)



Why Highway Planting & EC?

- Environmental Compliance
 - Revegetation
 - Mitigation Planting
 - Erosion Control



What's the Common Thread?

- Safety
- Aesthetics
- Environmental Compliance

What's the Common Thread?

Plants

Soils Resource Eval. System

- Factors Limit Plant Growth?
- Treatments That Address Limits?

SOIL RESOURCE EVALUATION
a stepwise process for regeneration and revegetation of
of drastically disturbed soils



Introduction Expert System Soils Course Case Studies Application Examples

California Department of Transportation, Office of Stormwater Prevention and Headquarters Landscape Architecture

Federal Highways Works Administration

University of California, Davis, Department of Land, Air and Water Resources, Soils and Revegetation Lab

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Key Problem

- Key Factors That Limit Plant Growth
 - Slope Stability
 - Protection From Erosion
 - Available Water/Infiltration
 - Nutrient Availability
 - Biological Activity

Key Treatment

Compost

Compost and Soil Structure



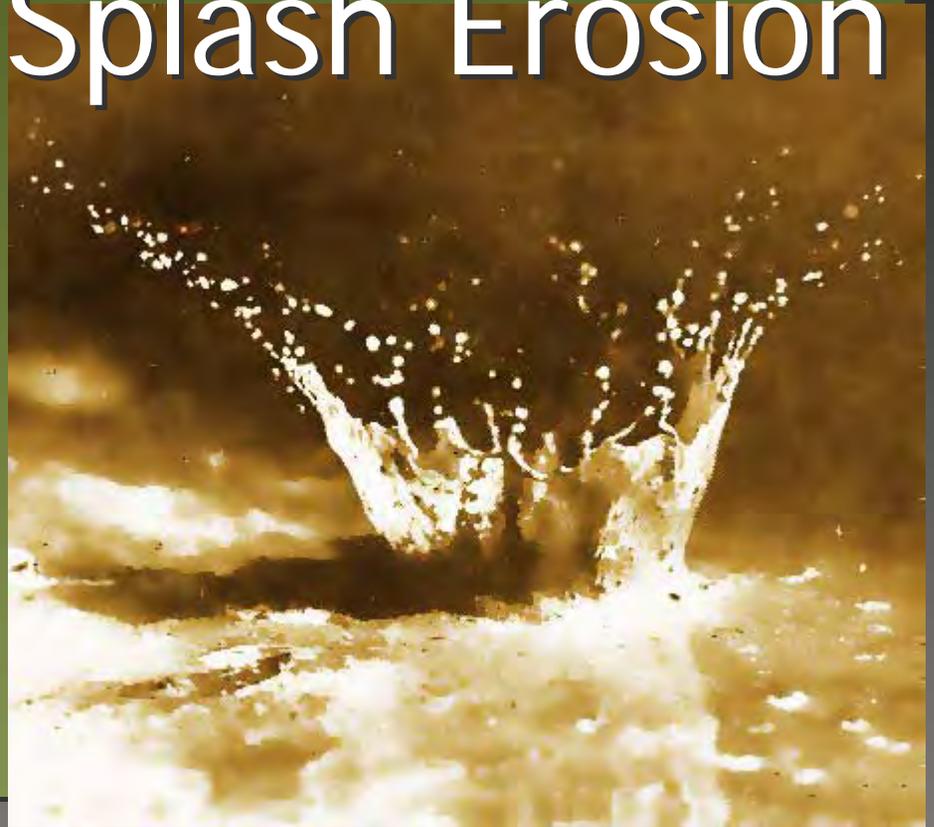
- Soil Soaked in Bleach
 - No Organics
 - Collapsed Structure
 - Rainfall = Erosion
 - Limited Infiltration
 - Little Retained Moisture
- Class I Ag Topsoil
 - Plenty of Organics
 - Strong Structure
 - Limited Erosion
 - Significant Infiltration
 - Moisture Retention

Compost and Soil Structure

- Reduced Splash/Rill Erosion
- Reduced Runoff Volume & Rate
- Increased Infiltration
- Increased Water Holding Capacity

Compost and Soil Structure

- Reduced Splash Erosion



Compost and Soil Structure

- Reduced Runoff Volume
 - Half the Volume of Bare Soil

Compost and Soil Structure

- Reduced Runoff Rate
 - Half the Peak Rate of Bare Soil

Compost and Soil Structure

- Increased Infiltration
 - Double the Infiltration Volume of Bare Soil



Compost and Soil Structure

- Increased Water Holding Capacity
 - Double the Volume of Water Retained Than Bare Soil



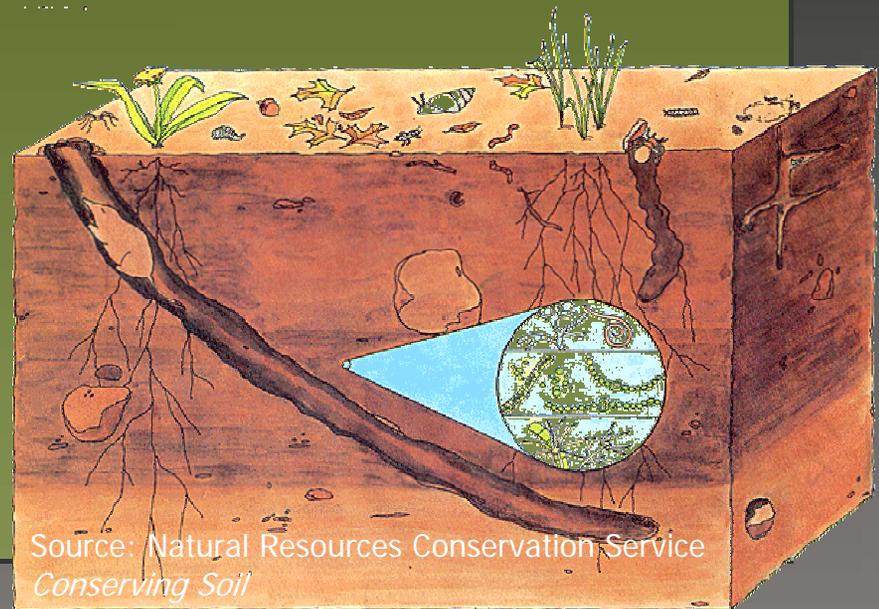
Compost and Soil Structure

- Less Runoff & More Water in The Soil...



Other Compost Benefits

- Improved Biological Activity
 - Food & Air
 - Soil Bacteria
 - Actinomycetes
 - Fungi
- Plant Nutrients



Source: Natural Resources Conservation Service
Conserving Soil

Recap



- Healthy Plants
- Healthy Soil
- Compost



What Is Compost?

What is
Compost?



What Is Compost?



Time



Temperature



Compost

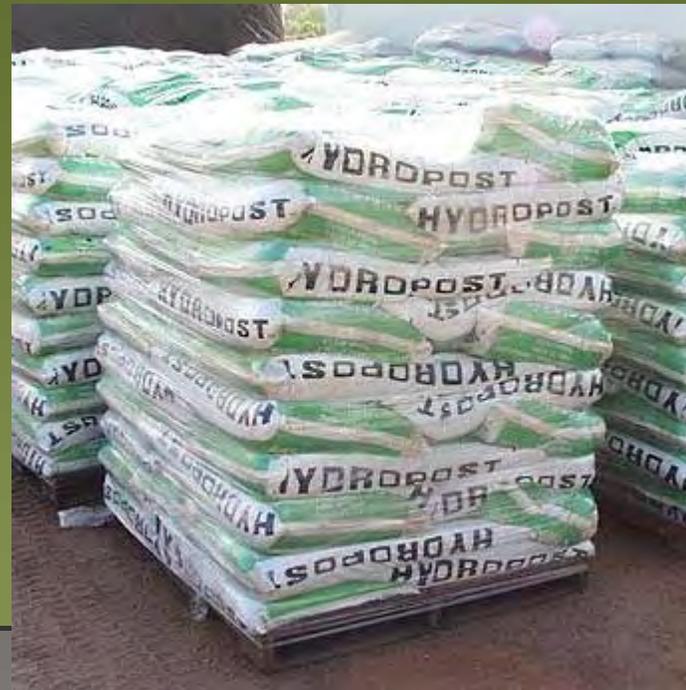
What Is Compost?

Is This Compost?



What Is Compost?

Or This?



What Is Compost?

Or This?



What Is Compost?



Time



Temperature



Compost

New/Revised Specifications

Specs

Why Revise The Spec?

Why Revise the Compost Material Specification?

CALTRANS DRAFT COMPOST SPEC. (1/2/97)

"COMPOST: - Compost shall be derived from green material consisting of chipped, shredded, or ground vegetation or clean processed recycled wood products, or a Class A, exceptional quality bio-solids compost, as required by USEPA, 40 CFR, part 503c regulations. Compost shall be processed or controlled to reduce seed viability, pathogens, and deleterious materials and shall not contain paint, petroleum products, herbicides, fungicides, or other chemical residues that would be harmful to plant or animal life. Other deleterious material such as plastic, glass, metal or rocks, shall not exceed 0.1 percent by weight or volume. A minimum internal temperature of 125 degrees F shall be maintained at least 15 continuous days during the composting process. Compost shall be tested for maturity/stability at least five times during the composting process and shall be tested at least 90 days after the end of the 15 day thermophilic compost process has been completed. Compost shall be screened through a minimum of 3/8 inch screen.

The moisture content of the compost shall not exceed 25%. Moisture content shall be defined by ASTM Test D 2216. Compost made with high moisture content may be used provided the weight of the compost is increased to equal compost with a maximum moisture content of 25%.

Compost shall be tested for maturity/stability with a Solvita Test Kit supplied by the compost producer. The compost shall measure a minimum of 7 on the maturity/stability scale."

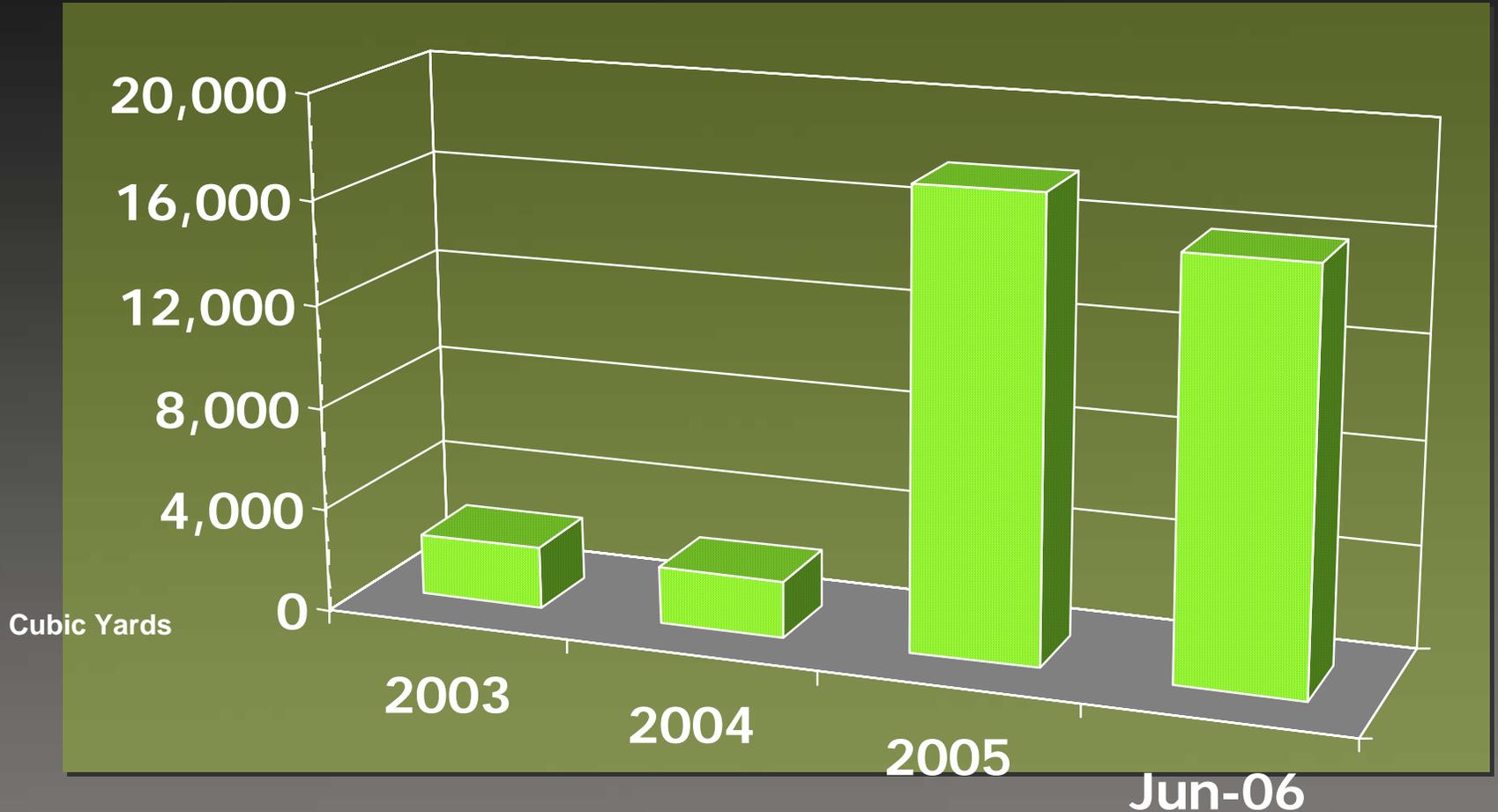
Why Revise The Spec?

- Lower Cost
- Improve Quality Control
- New Ideas

Why Revise The Spec?

Cost

Compost Use Increasing



Costs Remain High



Why Revise? Lower Cost

- Current Weighted Avg > \$300/CY
- High Price Due To:
 - Bagged (vs Bulk) Materials
 - Application Method (Hydroseeding)

Revisions Promote:

- Use Bulk (vs. Bagged) Materials
- Alternative Application Methods
 - Bulldozer
 - Slinger Spreader
 - Snow-Blower

Goal: Reduce Cost to \$40/CY

Cost Recap



Application Flexibility =
Lower Costs



Why Revise The Spec?

QC

Why Revise? Quality Control

Old Spec Tests For:

- Maturity

Why Revise? Quality Control

New Spec Tests For:

- Maturity
- pH
- Soluble Salts
- Stability
- Pathogens
- Stability
- Phytotoxicity
- Particle Size
- Physical Contaminants
- Heavy Metals

Old QC/QA Submittals

- Contractor Performs Solvita Test (For Maturity) in the Field
- Contractor Submits Results to the Engineer

New QC/QA Submittals

- Producer Submits Samples to STA Lab
- Samples Tested via STA Methodologies
- Results Returned to Compost Facility
- Paperwork Submitted by Contractor:
 - Compost Lab Test Results
 - Certificate of Compliance
 - Compost Technical Data Sheet (CTDS)

QC Recap



- Improved (Standardized) Testing
- Improved Submittals
- Greater Quality Assurance



New/Revised Specifications

New Ideas



New Ideas

Cost Effective Bulk Application Methods



EC (Type C) vs EC (Cultivate)

Which Is The More Permanent Solution?



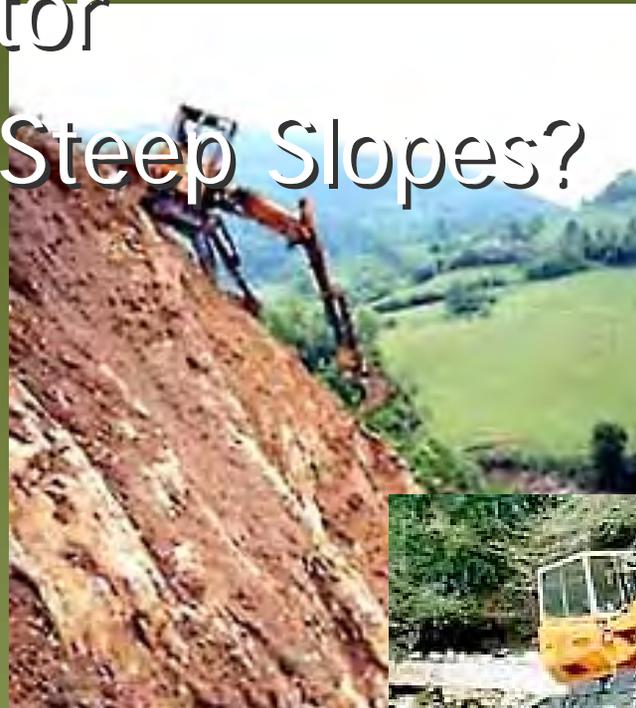
Rotary Spading Machines

- Rotary Spading Machines
 - 22" Depth – Single Pass
 - 8' Wide
 - 3800 LBS
 - 1-3 MPH
 - 90 HP Tractor



Other Incorporation Options

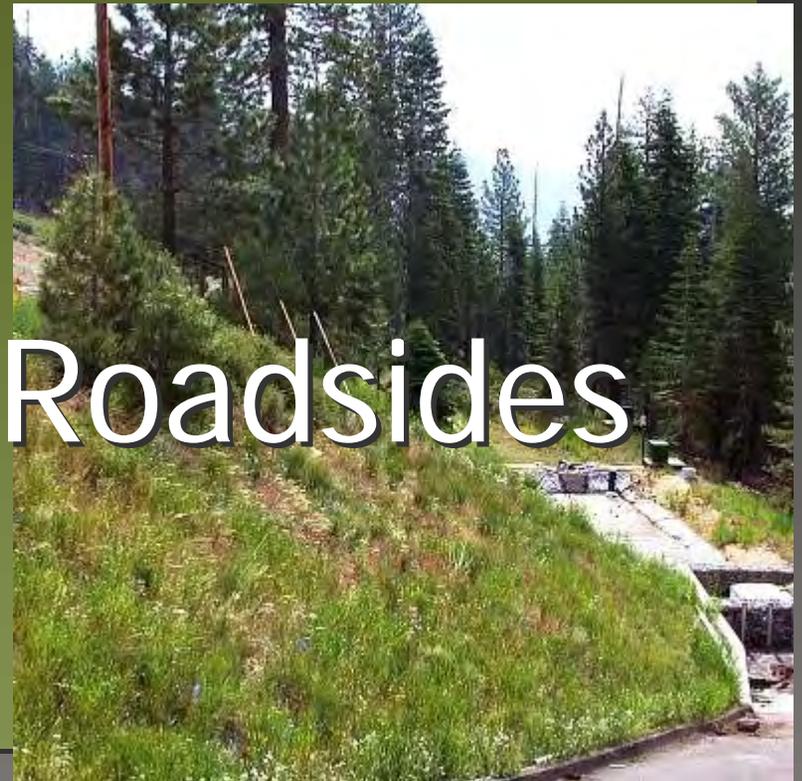
- Spider Excavator
- An Option for Steep Slopes?



Ideas Recap

RECAP

- New Ideas
- New Specs
- Sustainable Roadsides



New/Revised Specifications

The Specs



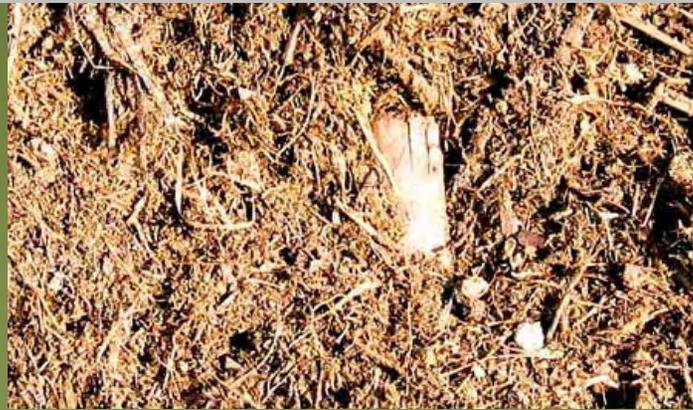
New/Revised Specifications

Planting Specs



Planting Specifications

- Mulch
- Soil Amendment



Planting Specifications

■ Mulch

- Revised Compost Definition

■ Soil Amendment



- Replaces "Std Spec" Compost Definition

■ Planting

- Removed Std Spec Soil Amend Reference

New/Revised Specifications

EC
Specs



Erosion Control (Type C/D)

- Erosion Control (Type C)
- Erosion Control (Type D)



Erosion Control (Drill Seed)

- Erosion Control (Drill Seed)



EC (Compost Blanket & Cultivate)

- Erosion Control (Compost Blanket)
- Erosion Control (Cultivate)



EC Specifications

- EC (Type C & Type D)
 - Updated Compost Definition
 - Removed Seed Inoculant Reqt.
 - Pay by Area
- EC Drill Seed
 - Added Compost Definition
- EC (Compost Blanket) 
- EC (Cultivate) 

New/Revised Specifications

All
Specs



Compost – “Materials” Spec

Compost Shall Comply
With the Following...

Producer Requirements

Compost Producer Shall be Fully Permitted Per:

- California Integrated Waste Management Board
- Local Enforcement Agencies
- Any Other State and Local Agencies That Regulate Solid Waste Facilities



Feedstock Options

- Green Material
 - Chipped, Shredded, or Ground Vegetation
 - Clean, Processed, Recycled Wood Products
- Biosolids
- Manure
- Mixed Food Waste

All Materials

- Shall be Composted to Reduce Weed Seed and Pathogens in Conformance with CA. Title 14, CCR, Div. 7, Ch. 3.1, Art. 7, Sec. 17868.3
 - Similar To US EPA Regulation 40 CFR, Part 503b

Compost Shall NOT

- Be Derived from Mixed Municipal Solid Waste.
- Contain Paint, Petroleum Products, Herbicides, Fungicides.
- Contain Chemicals Harmful to Animal or Plant Life.

Compost Shall NOT

- Possess Objectionable Odors
- Possess Metal Concentrations Exceeding Title 14, CCR, Div. 7, Ch. 3.1, Sect. 17868.2

Submittal Requirements

- Compost Technical Data Sheet
- Copy of the Compost Producer's STA certification
- Certificate of Compliance (Per Caltrans Std Specs).

New/Revised Specifications

Recap

Recap

RECAP

■ Planting Specifications

- Mulch
- Soil Amendment
- Planting

NEW!

■ Erosion Control Specifications

- Erosion Control (Type C & Type D)
- Erosion Control (Drill Seed)
- Erosion Control (Compost Blanket)
- Erosion Control (Cultivate)

NEW!

NEW!

Planting Specifications

<http://pd.dot.ca.gov/design/landscape/nssp/planting.htm>

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Planting NSSPs

These nonstandard special provisions are in "Final Draft" form and may be used in current projects provided only *minor* edits are made. Significant edits will trigger the nonstandard special provision review process - requiring submittal, review and concurrence by the Specification Owner. When in doubt - discuss the proposed edits with your [HQ LAP Landscape Coordinator](#).

For more information regarding the use of these nonstandard specifications, please visit our [FAQ](#) page.

New?	Description	Blanket Concurrence	CAD Detail
Revised	Planting (English) Planting (Metric) Revised to reference the new Draft NSSP for Soil Amendment, rather than the Standard Specifications Section 20-2.03 Soil Amendment.	Not Available Contact Your District Landscape Coordinator	No Detail
New	Soil Amendment (English) Soil Amendment (Metric) Replaces the Standard Specification Section 20-2.03 "Soil Amendment." Includes updated Department definition of compost	Not Available Contact Your District Landscape Coordinator	No Detail
Revised	Mulch (English) Mulch (Metric) Revised to use updated Department definition of compost. Use the Standard BEEs item for Mulch.	Not Available Contact Your District Landscape Coordinator	No Detail

Erosion Control Specifications

<http://pd.dot.ca.gov/design/landscape/nssp/ec.htm>

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Erosion Control NSSPs

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New?	Description	Blanket Concurrence	CAD Detail
New	Erosion Control (Type C) English Erosion Control (Type C) Metric Supersedes the Erosion Control (Type C) SSP currently on the DES/OE Server.		No Detail
New	Erosion Control (Type D) English Erosion Control (Type D) Metric Supersedes the Erosion Control (Type D) SSP currently on the DES/OE Server.		No Detail
New	Erosion Control (Type M) English Erosion Control (Type M) Metric Compost Blanket NSSP. Covers installation of compost and seed, to form a fibrous blanket to help establish permanent roadside vegetation, minimize weed competition, minimize topsoil loss, retain soil moisture, improve soil structure and fertility.		No Detail
New	Erosion Control (Drill Seed) English Erosion Control (Drill Seed) Metric Covers drill seeding of areas to provide permanent erosion control. Use drill seeding to establish vegetation on slopes no greater than 4:1 (H:V) that are accessible from the roadway. Add a nonstandard item (measured by the square meter) for Erosion Control (Drill Seed) to the BEEs/Engineer's Estimate. Use this specification together with other appropriate storm water BMPs.		No Detail

Remember

Use the Specs





Using Compost to Improve Erosion Control and Highway Planting

Thank-You

The Laboratory

- Compost Filter Socks
 - Currently Under New Products Review Process

