Soils, Vegetation, Erosion, Stormwater Runoff, & Compost

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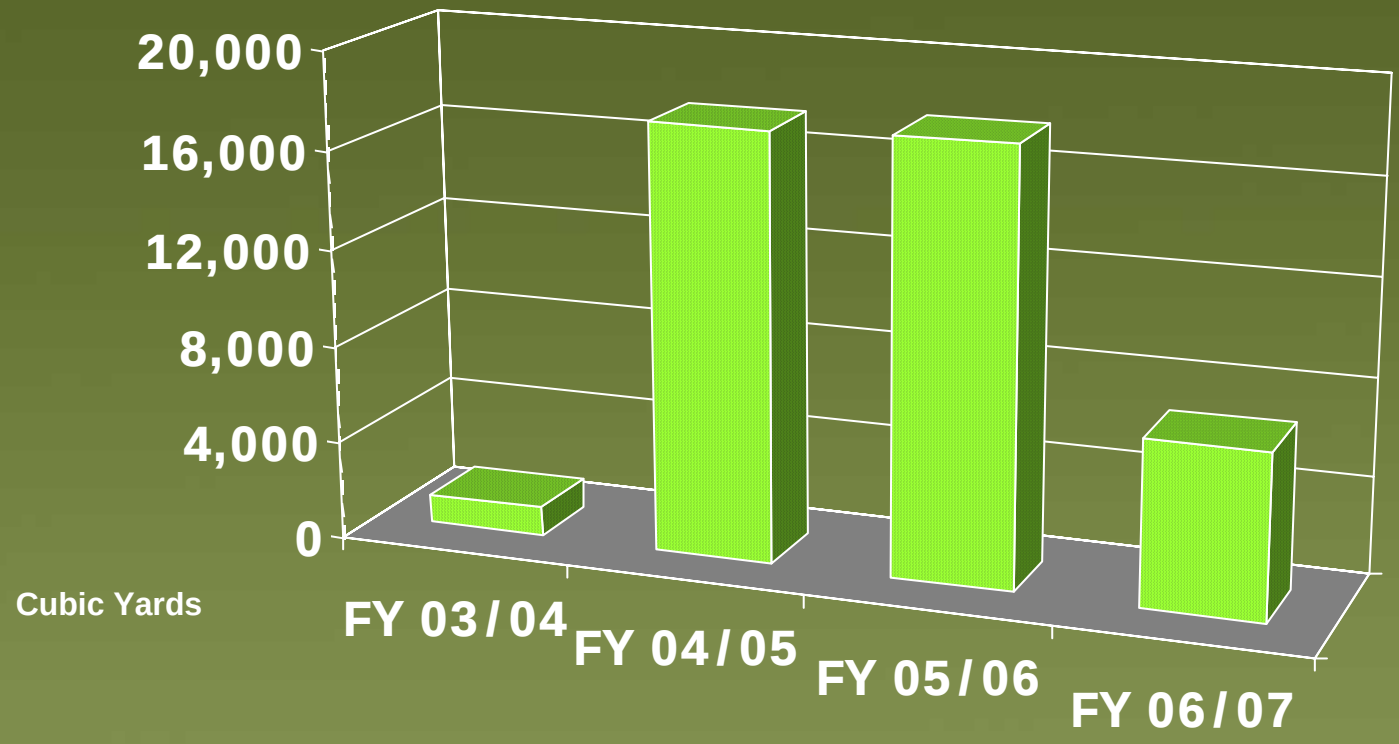
Office of Roadside Management
& Landscape Architecture Standards

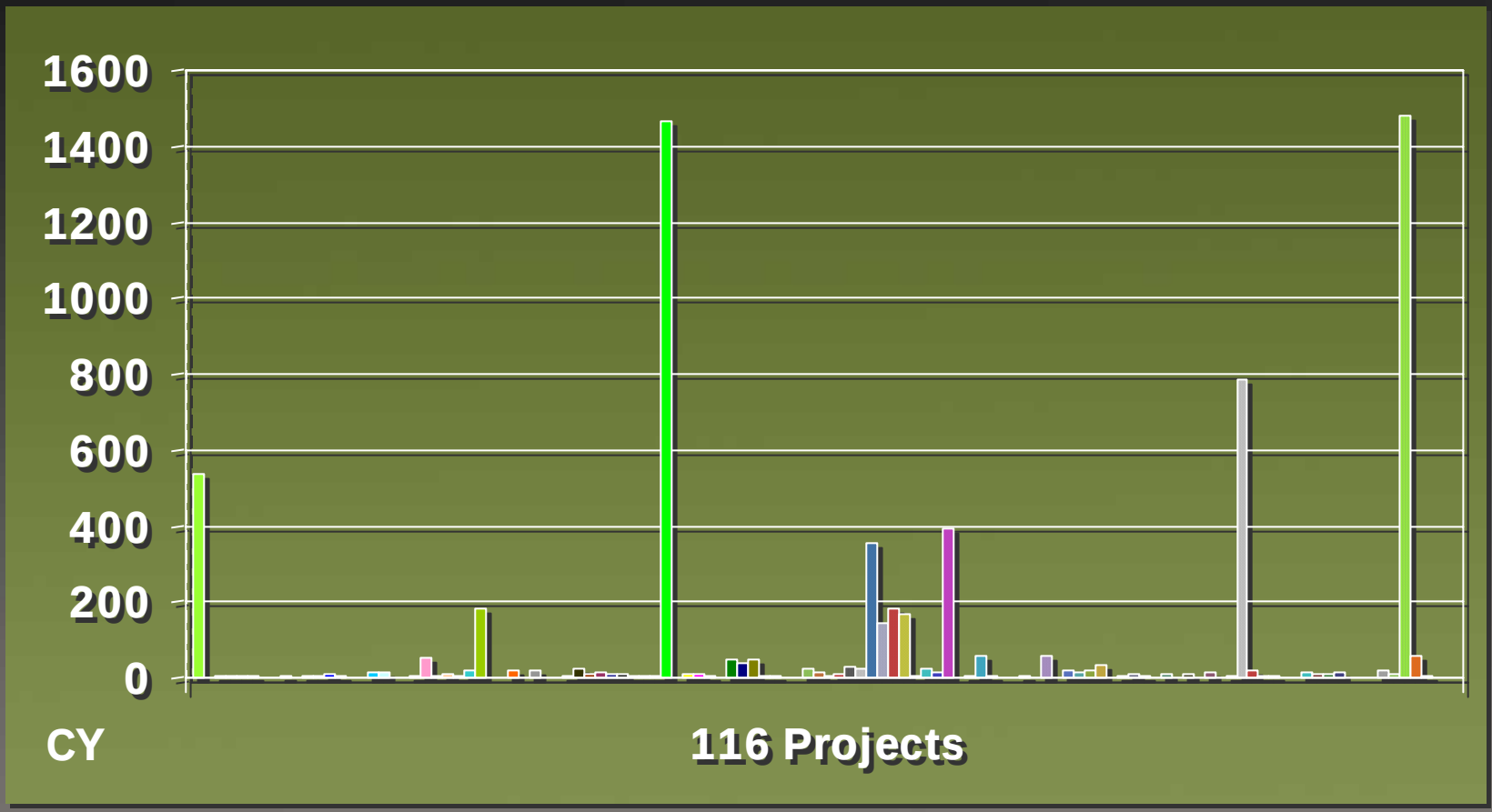
Compost Benefits

- Healthy Soils
- Healthy Vegetation
- Erosion Control
- Sediment Control

Historic Compost Use



FY 06-07 Compost Use



Keys to Increased Use

- Cost
- Specs
- Training

Key: Reduce Cost

Cost

Key: Reduce Cost

Historic Weighted Average:

$300/cy

Key: Reduce Cost

High Price Due To:

- Material Type
  - Bagged Compost (vs. Bulk)

Key: Reduce Cost

High Price Due To:

- Application Method
  - Hydroseed (vs. Blower Truck)

Key: Reduce Cost

- Specs Revised to Allow Bulk (As Well as Bagged) Materials

2. Compost may be dry applied at the total of the rates specified in the preceding table and the following table instead of including it as part of the hydro-seeding operations. In areas where the compost is dry applied, all compost for that area must be applied before the next operation.

Key: Reduce Cost

- New Specifications:
  - Erosion Control (Compost Blanket)
  - Compost (Incorporate)

Key: Reduce Cost

New Cost:

$60/cy

Cost Recap

New (Bulk Material) Specs = Lower Costs

Key: Specifications

Specs

Specifications

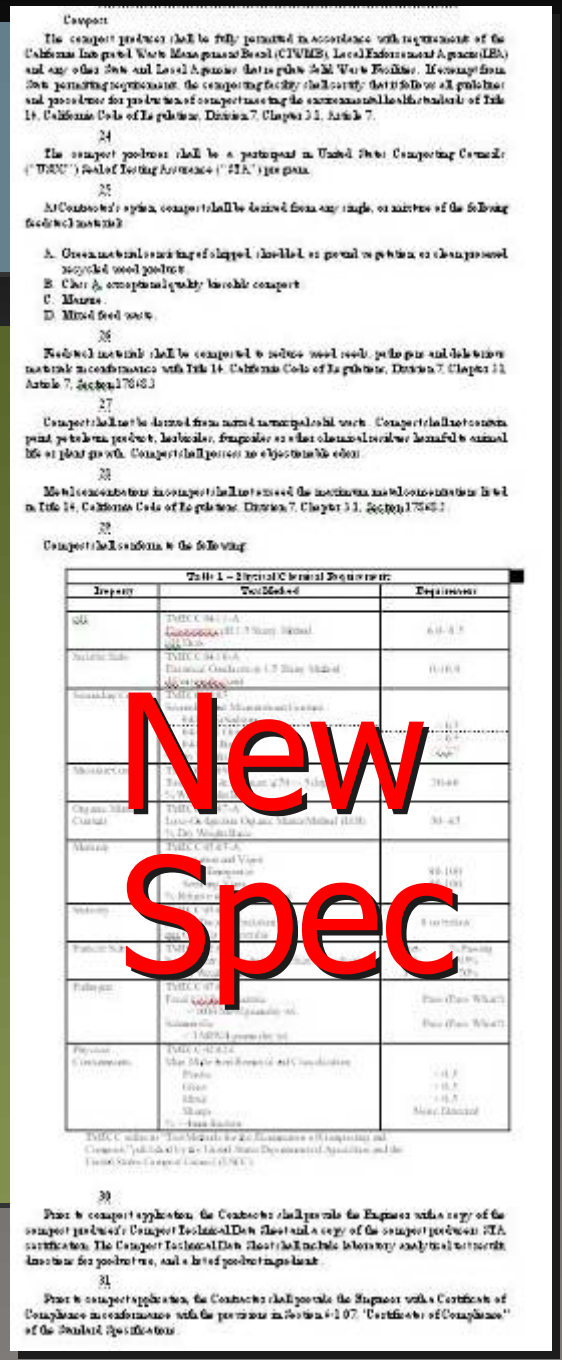
CALTRANS DRAFT COMPOST SPEC. (1/2/97)

"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 biosolids compost, as required by US EPA, 40 CFR, part 503c regulations, or a combination of green waste and biosolids compost. The compost shall be processed or completed to reduce weed seeds, pathogens, and deleterious material and shall not contain paint, petr[illegible]ts, herb[illegible]des, fun[illegible] or other chemical residues that would be harmful t[illegible] plant o[illegible] [illegible]ther de[illegible]rious [illegible] glass, metal or rocks, sha[illegible] not ex[illegible] [illegible]erce[illegible] by weight or [illegible]. A [illegible] [illegible]rnal temperature of 135 degree[illegible] [illegible] for at [illegible] [illegible] composting process. The compost shall be thoroughly turned [illegible] minimum of five times during the composting process,and shall go through a minimum 90 days curing period after 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 California Test 226. Compost Products with a higher 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."

Old Spec



Compost

The compost producer shall be fully permitted in accordance with requirements of the California Integrated Waste Management Board (CIWMB), Local Enforcement Agencies (LEA) and any other State and Local Agencies that regulate Solid Waste Facilities. If exempt from State permitting requirements, the composting facility shall certify that it follows all guidelines and procedures for production of compost meeting the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7.

24

The compost producer shall be a participant in United States Composting Councils ("USCC") Seal of Testing Assurance ("STA") program.

25

At Contractor's option, compost shall be derived from any single, or mixture of the following feedstock materials:

A. Green material consisting of chipped, shredded, or ground vegetation or clean processed recycled wood products.
B. Class A, exceptional quality biosolids compost.
C. Manure.
D. Mixed food waste.

26

Feedstock materials shall be composted to reduce weed seeds, pathogens and deleterious materials in conformance with Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7, Section 17868.3

27

Compost shall not be derived from mixed municipal solid waste. Compost shall not contain paint, petroleum products, herbicides, fungicides or other chemical residues harmful to animal life or plant growth. Compost shall possess no objectionable odors.

28

Metal concentrations in compost shall not exceed the maximum metal concentrations listed in Title 14, California Code of Regulations, Division 7, Chapter 3.1, Section 17868.3

29

Compost shall conform to the following:

Table 1 – Physical Chemical Requirements

Property	Test Method	Requirement
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

TMECC indicates "Test Methods for the Examination of Composting and Compost" published by the United States Department of Agriculture and the United States Compost Council (USCC).

30

Prior to compost application, the Contractor shall provide the Engineer with a copy of the compost producer's Compost Technical Data Sheet and a copy of the compost producer's STA certification. The Compost Technical Data Sheet shall include laboratory analytical test results, directions for product use, and a list of product ingredients.

31

Prior to compost application, the Contractor shall provide the Engineer with a Certificate of Compliance in conformance with the provisions in Section 4-1.07, "Certificates of Compliance" of the Standard Specifications.

New Spec

Standard Language

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

Feedstocks

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

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

Standard Test Methods

USCC Seal of Testing Assurance (STA) Program:

- Regular Testing of Compost
- Standard Testing Methodologies
- Certified Labs

Quality Control

Old Spec Tests For:

- Maturity

Quality Control

New Spec Tests For:

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

Streamlined Submittals

Project Specifications

Physical/Chemical Requirements

Property	Test Method	Requirement
pH	*TMECC 04.11-A, Elastometric pH 1:5 Slurry Method, pH Units	6.0–8.0
Soluble Salts	TMECC 04.10-A, Electrical Conductivity 1:5 Slurry Method dS/m (mmhos/cm)	0-10.0
Moisture Content	TMECC 03.09-A, Total Solids & Moisture at 70+/- 5 deg C, % Wet Weight Basis	N/A
Organic Matter Content	TMECC 05.07-A, Loss-On-Ignition Organic Matter Method (LOI), % Dry Weight Basis	30–65
Maturity	TMECC 05.05-A, Germination and Vigor Seed Emergence Seedling Vigor % Relative to Positive Control	 80 or Above 80 or Above
Stability	TMECC 05.08-B, Carbon Dioxide Evolution Rate mg CO_2-C/g OM per day	8 or below
Particle Size	TMECC 02.02-B Sample Sieving for Aggregate Size Classification % Dry Weight Basis	95% Passing 5/8 inch 70% Passing 3/8 inch
Pathogen	TMECC 07.01-B, Fecal Coliform Bacteria < 1000 MPN/gram dry wt.	Pass
Pathogen	TMECC 07.01-B, Salmonella < 3 MPN/4 grams dry wt.	Pass
Physical Contaminants	TMECC 02.02-C, Man Made Inert Removal and Classification: Plastic, Glass and Metal, % > 4mm fraction	Combined Total: < 1.0
Physical Contaminants	TMECC 02.02-C, Man Made Inert Removal and Classification: Sharps (Sewing needles, straight pins and hypodermic needles), % > 4mm fraction	None Detected

*TMECC refers to "Test Methods for the Examination of Composting and Compost," published by the United States Department of Agriculture and the United States Compost Council (USCC).

Data Sheet From Contractor

US COMPOSTING COUNCIL
Seal of Testing Assurance

Caltrans

Product Identification:

Date Sampled/Received:

COMPOST TECHNICAL DATA SHEET for Caltrans

LABORATORY:

Compost Parameters	*Test Results*	*Reported as (units of measure)*	*TMECC Test Method*
pH		Unitless	04.11-A 1:5 Slurry pH
Soluble Salts (electrical conductivity)		dS/m (mmhos/cm)	04.10-A 1:5 Slurry Method Mass Basis
Moisture content		%, dry weight basis	03.09-A - Total Solids and Moisture
Organic Matter Content		%, dry weight basis	05.07-A Loss-on-Ignition Organic Matter Method (LOI)
Maturity Indicator (bioassay) Percent Emergence Relative Seedling Vigor		 average % of control average % of control	05.05-A Germination and vigor
Stability Indicator		mg CO2-C/g OM/day	05.08-B Carbon Dioxide Evolution Rate
Particle Size		% dry weight passing through 9.5 mm	02.02-B Sample Sieving for Aggregate Size Classification
Pathogens		PASS/FAIL: Per US EPA Class A standard, 40 CFR 503.32(a)	07.01-B Fecal coliforms
Pathogens		PASS/FAIL: Per US EPA Class A standard, 40 CFR 503.32(a)	07.02 Salmonella
Physical Contaminants		%, dry weight basis	02.02-C - Man-Made Inerts Total content
Physical Contaminants		%, dry weight basis	02.02-C - Man-Made Inerts Sharps content

Key: Specifications

- Planting Specifications
  - Mulch
  - Soil Amendment
- Erosion Control Specifications
  - Erosion Control (Type C & Type D)
  - Erosion Control (Drill Seed)
  - Erosion Control (Compost Blanket) NEW!
  - Compost (Incorporate) NEW!

Planting Specifications

- Mulch
- Soil Amendment

Erosion Control (Type C/D)

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

Erosion Control (Type C/D)

- Erosion Control (Type C)
  - Seed, Fiber, Tack, Crimped Straw, Compost
- Erosion Control (Type D)
  - Seed, Fiber, Tack, Compost

Erosion Control (Type C/D)

Physical/Chemical Requirements		
Property	Test Method	Requirement
pH	*TMECC 04.11-A, Elastometric pH 1:5 Slurry Method, pH Units	6.0–8.0
Soluble Salts	TMECC 04.10-A, Electrical Conductivity 1:5 Slurry Method dS/m (mmhos/cm)	0-10.0
Moisture Content	TMECC 03.09-A, Total Solids & Moisture at 70+/- 5 deg C, % Wet Weight Basis	N/A
Organic Matter Content	TMECC 05.07-A, Loss-On-Ignition Organic Matter Method (LOI), % Dry Weight Basis	30–65
Maturity	TMECC 05.05-A, Germination and Vigor Seed Emergence Seedling Vigor % Relative to Positive Control	 80 or Above 80 or Above
Stability	TMECC 05.08-B, Carbon Dioxide Evolution Rate mg CO_2-C/g OM per day	8 or below
Particle Size	TMECC 02.02-B Sample Sieving for Aggregate Size Classification % Dry Weight Basis	95% Passing 5/8 inch 70% Passing 3/8 inch
Pathogen	TMECC 07.01-B, Fecal Coliform Bacteria < 1000 MPN/gram dry wt.	Pass
Pathogen	TMECC 07.01-B, Salmonella < 3 MPN/4 grams dry wt.	Pass
Physical Contaminants	TMECC 02.02-C, Man Made Inert Removal and Classification: Plastic, Glass and Metal, % > 4mm fraction	Combined Total: < 1.0
Physical Contaminants	TMECC 02.02-C, Man Made Inert Removal and Classification: Sharps (Sewing needles, straight pins and hypodermic needles), % > 4mm fraction	None Detected

Erosion Control (Type C/D)

Erosion Control (Drill Seed)

- Erosion Control (Drill Seed)

≤5:1

Erosion Control (Drill Seed)

- Incorporate 1” Compost Blanket
- Apply Seed via Drill Seeder
- Apply Tack via Hydroseed Rig

EC (Compost Blanket)

NEW!

Erosion Control (Compost Blanket)

≤3:1 ?

EC (Compost Blanket)

- 1-2” Compost Blanket
- Seed Application Options:
  a) Blower Truck (With Compost)
  b) “Belly Grinder”
  c) Separate Type D Application

EC (Compost Blanket)

Property	Test Method	Requirement
pH	*TMECC 04.11-A Elastometric pH 1:5 Slurry Method pH Units	6.0–8.0
Soluble Salts	TMECC 04.10-A Electrical Conductivity 1:5 Slurry Method dS/m (mmhos/cm)	0-10.0
Moisture Content	TMECC 03.09-A Total Solids & Moisture at 70+/- 5 deg C % Wet Weight Basis	30-60
Organic Matter Content	TMECC 05.07-A Loss-On-Ignition Organic Matter Method (LOI) % Dry Weight Basis	30–65
Maturity	TMECC 05.05-A Germination and Vigor Seed Emergence Seedling Vigor % Relative to Positive Control	 80 or Above 80 or Above
Stability	TMECC 05.08-B Carbon Dioxide Evolution Rate mg CO_2-C/g OM per day	8 or below
Particle Size	TMECC 02.02-B Sample Sieving for Aggregate Size Classification % Dry Weight Basis	100% Passing, 3 inch 90-100% Passing, 1 inch 65-100% Passing, 3/4 inch 0 - 75% Passing, 1/4 inch Maximum length 6 inches
Pathogen	TMECC 07.01-B Fecal Coliform Bacteria < 1000 MPN/gram dry wt.	Pass
Pathogen	TMECC 07.01-B Salmonella < 3 MPN/4 grams dry wt.	Pass

Compost (Incorporate)

Compost (Incorporate)

NEW!

≤3:1

Compost (Incorporate)

- Apply 4” Compost
- Incorporate 12-18” in Depth
- Follow with Erosion Control (Type D) Application
  - Seed, Fiber, Tack

Compost (Incorporate)

Physical/Chemical Requirements		
Property	Test Method	Requirement
pH	*TMECC 04.11-A Elastometric pH 1:5 Slurry Method pH Units	6.0–8.0
Soluble Salts	TMECC 04.10-A Electrical Conductivity 1:5 Slurry Method dS/m (mmhos/cm)	0-10.0
Moisture Content	TMECC 03.09-A Total Solids & Moisture at 70+/- 5 deg C % Wet Weight Basis	30-60
Organic Matter Content	TMECC 05.07-A Loss-On-Ignition Organic Matter Method (LOI) % Dry Weight Basis	30–65
Maturity	TMECC 05.05-A Germination and Vigor Seed Emergence Seedling Vigor % Relative to Positive Control	 80 or Above 80 or Above
Stability	TMECC 05.08-B Carbon Dioxide Evolution Rate mg CO_2-C/g OM per day	8 or below
Particle Size	TMECC 02.02-B Sample Sieving for Aggregate Size Classification % Dry Weight Basis	Inches % Passing 3 99% 3/8 < 25% Max. Length 4 inches
Pathogen	TMECC 07.01-B Fecal Coliform Bacteria < 1000 MPN/gram dry wt.	Pass
Pathogen	TMECC 07.01-B Salmonella < 3 MPN/4 grams dry wt.	Pass

Key: Specifications

- Under Development
  - Erosion Control "(Type H)"
  - Compost Filter Strip
  - Compost Filter Berm

EC (Type H) Under Development

Jute

Compost Mulch (½” - 1”)

Hydroseed (Seed, Fiber, Tack)

1.5:1 ?

EC (Type H) Under Development

	% Wet Weight Basis	
Organic Matter Content	TMECC 05.07-A Loss-On-Ignition Organic Matter Method (LOI) % Dry Weight Basis	30–65
Maturity	TMECC 05.05-A Germination and Vigor Seed Emergence Seedling Vigor % Relative to Positive Control	 80 or Above 80 or Above
Stability	TMECC 05.08-B Carbon Dioxide Evolution Rate mg CO_2-C/g OM per day	8 or below
Particle Size	TMECC 02.02-B Sample Sieving for Aggregate Size Classification % Dry Weight Basis	Inches % Passing 3 99% 3/8 < 25% Max. Length 4 inches
Pathogen	TMECC 07.01-B Fecal Coliform Bacteria < 1000 MPN/gram dry wt.	Pass
Pathogen	TMECC 07.01-B Salmonella < 3 MPN/4 grams dry wt.	Pass

Specs Recap

- More Complete Testing
- Standard Test Methods
- Streamlined Submittals
- Improved Quality Control

Key: Training

Training

Recap

- Cost
- Specs
- Training

Specifier Beware:

Specifier Beware:

Specifier Beware:

- Test Soils
- 4:1 (H:V) Max - Incorporate Compost
- Coordinate w/Geotech

Case Studies

Case Studies

Cal Poly

Cal Poly

Cal Poly

Bare Soil

1/2” Compost

Cal Poly

Bare Soil

1/2” Compost

Cal Poly

Plants – The Ultimate BMP

Myers - Hwy 50

If a Little Compost is Good…

3" Duff & Compost
Non-Incorporated

Hwy 50 at Meyers
South Lake Tahoe

If a Little Compost is Good…

3” Duff & Compost
Non-Incorporated

Hwy 50 at Meyers
South Lake Tahoe

Brockway Summit - Pla 267

More Compost is Better

2004 – Incorporate Compost

4" Duff & Compost
Incorporated 15-18 Inches

2004 – Finished Slope

Pla 267 at Brockway Summit
Lake Tahoe

More Compost is Better

4" Duff & Compost
Incorporated 15-18 Inches

SR 267 at Brockway Summit
Lake Tahoe

More Compost is Better

SR 267 at Brockway Summit
Lake Tahoe

Benefits Recap

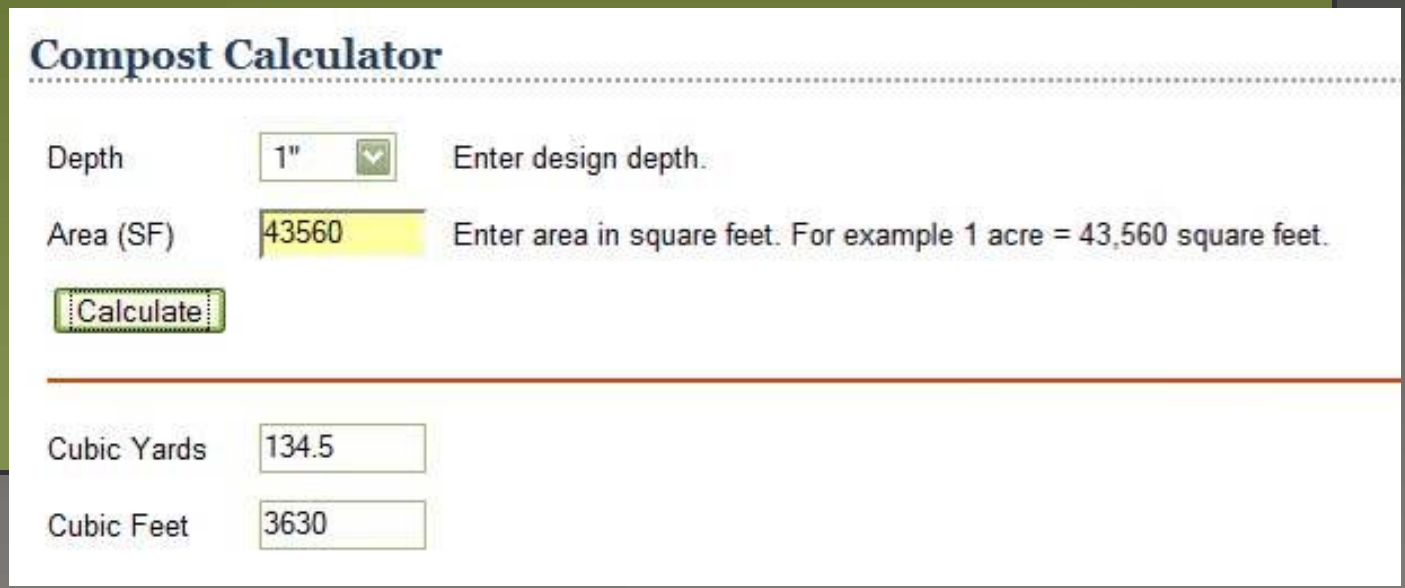
- Healthy Soils
- Healthy Vegetation
- Erosion Control
- Stormwater Runoff

Get the Specs:

- http://www.dot.ca.gov/hq/LandArch/policy/compost_specs.htm
- Or Google "Compost Specs Caltrans"
- Contact: gregory_balzer@dot.ca.gov

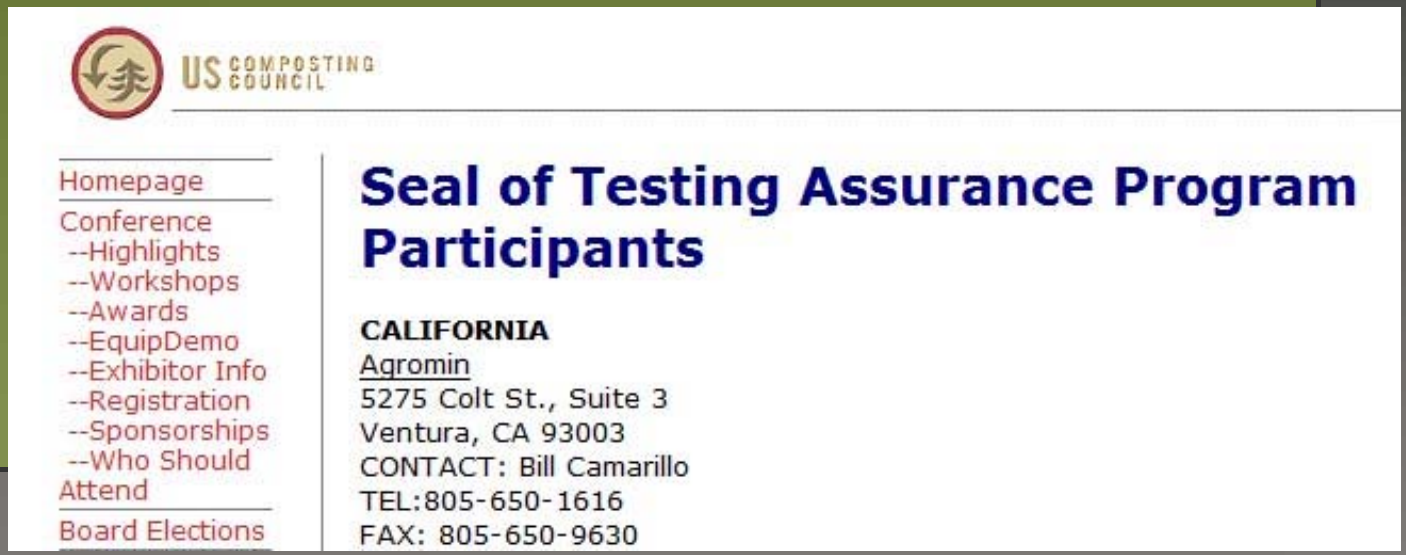
Other Tools:

- Compost Calculator



Other Tools:

- STA Participant List



Questions?