Field Trial
Compost Used with Planting Soil
Project 159-177
I-91/ROUTE 3 INTERCHANGE
Wethersfield, CT
One Year Evaluation Report
and Four Year Evaluation Report

Prepared by: Donald A. Larsen, P.E.
Kathy Wynkoop

January 2003

Report No.
116(42)-4-03-2

Connecticut Department of Transportation
Bureau of Engineering and Highway Operations
Office of Research and Materials

Keith R. Lane, P.E.
Director of Research and Materials

James M. Sime, P.E.
Assistant Manager for Research

Disclaimer

The contents of this report reflect the views of the authors who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Connecticut Department of Transportation or the Federal Highway Administration. The report does not constitute a standard, specification, or regulation.

SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	25.4	millimetres	mm
ft	foot	0.305	metres	m
yd	yards	0.914	metres	m
ml	**miles**	1.61	kilornetres	km
AREA				
in^2	square inches	645.2	millimetres squared	mm^2
ft^2	square feet	0.093	metres squared	m^2
yd^2	square yards	0.836	metres squared	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	kilometres squared	km^2
VOLUME				
fl oz	fluid ounces	29.57	milliletres	mL
gal	gallons	3.785	litres	L
ft^3	cubic feet	0.028	metres cubed	m^3
yd^3	cubic yards	0.765	metres cubed	m^3

NOTE: Volumes greater than 1000 L shall be shown in m^3.

MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5(F-32)/9	Celcius temperature	°C

*SI is the symbol for the International System of Measurement

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimetres	0.039	inches	in
m	metres	3.28	foot	ft
m	metres	1.09	yards	yd
km	kilometres	0.621	miles	**mi**
AREA				
mm^2	millimetres squared	0.0016	square inches	in^2
m^2	metres squared	10.764	square feet	ft^2
ha	hectares	2.47	acres	ac
km^2	kilornetres squared	0.386	square miles	mi^2
VOLUME				
mL	millilitres	0.034	fluid ounces	fl oz
L	litres	0.264	gallons	gal
m^3	metres cubed	35.315	cubic feet	ft^3
m^3	metres cubed	1.308	cubic yards	yd^3
MASS				
g	grams	0.035	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams	1.102	short tons (2000 lb)	T
TEMPERATURE (exact)				
°C	Celcius temperature	1.8C+32	Fahrenheit temperature F	°F

(Revised June 2000)

Table of Contents

List of Figures

List of Tables

List of Photographs

Field Trial
Compost Used with Planting Soil
Project 159-177
I-91/ROUTE 3 INTERCHANGE
WETHERSFIELD, CT

As an adjunct to the work performed for the EPA study entitled: "Field Testing CONEG Model Procurement Specifications for Source-Separated Compost," a mixture of compost and planting soil was used for tree and shrub plantings on a ConnDOT construction project. The I-91/Route 3 Interchange (Project 159-177), was used, since plantings were scheduled for April through November 1997, and the site was easy to access from ConnDOT Offices.

Spent mushroom substrate compost was used for the installation. The compost was donated by Earthgro, Inc. of Lebanon, CT during April 1997. Some of the shrubs and bushes were planted with compost during that month. However, a loss of information as to which plantings contained the compost required the study to be repeated. On August 19, 1997, it was decided to use additional compost during the fall plantings for this same project under close supervision of the ConnDOT Landscape Design Section. Two planting areas were designated for the study (Figure 1.) The first, was adjacent to the ramp to Route 3 westbound from I-91 South (Area A); and the second, adjacent to the ramp to Route 3 eastbound from I-91 North (Area B). The plants used in the study area are indicated on Figure 1 and listed in Table 1.

Earthgro, Inc. once again donated the compost, and DOT Maintenance personnel from the Franklin Garage picked up and delivered it to the project on September 22, 1997. From September 29, 1997 to November 21, 1997, plants were installed at the above-mentioned areas using two parts planting soil to one part compost. The plants with compost included Sugar Maples, Eastern White Pines, Doublefile Viburnum, Border Forsythia, Dwarf Winged Euonymus and Northern Bayberry as indicated in Figure 1 and Table 1. Existing ConnDOT specifications (Appendix A) were followed except that compost was substituted for peat. The plant beds were mulched with wood chips after the installation.

On January 12, 1998, all the plants with soil/compost mix were tagged with metal identification tags. The tags were labelled "compost 1997." A joint inventory between the DOT and the contractor was held on May 21, 1998. The inventory consisted of counting all the plant material throughout the planting project. Any dead material was removed. During the week of June 15, 1998, all plant replacements were done, along with a second application of fertilizer, some pruning and weeding. None of the plants containing compost needed replacing, i.e. the mortality rate was zero percent compared to a mortality rate of approximately 40 percent in the control plants containing the standard ConnDOT peat mix. The construction project was closed out later in July 1998.

On September 17, 1998, photographs were taken of several of the planting areas where compost was used. A few of these photographs are attached for reference (Photos #1-3). As of that date, it appears that the plant survival rate was still 100 percent. There was no apparent difference in condition between plants with compost and those without. It is possible that more than one growing season will be required before any noteworthy difference would be seen.

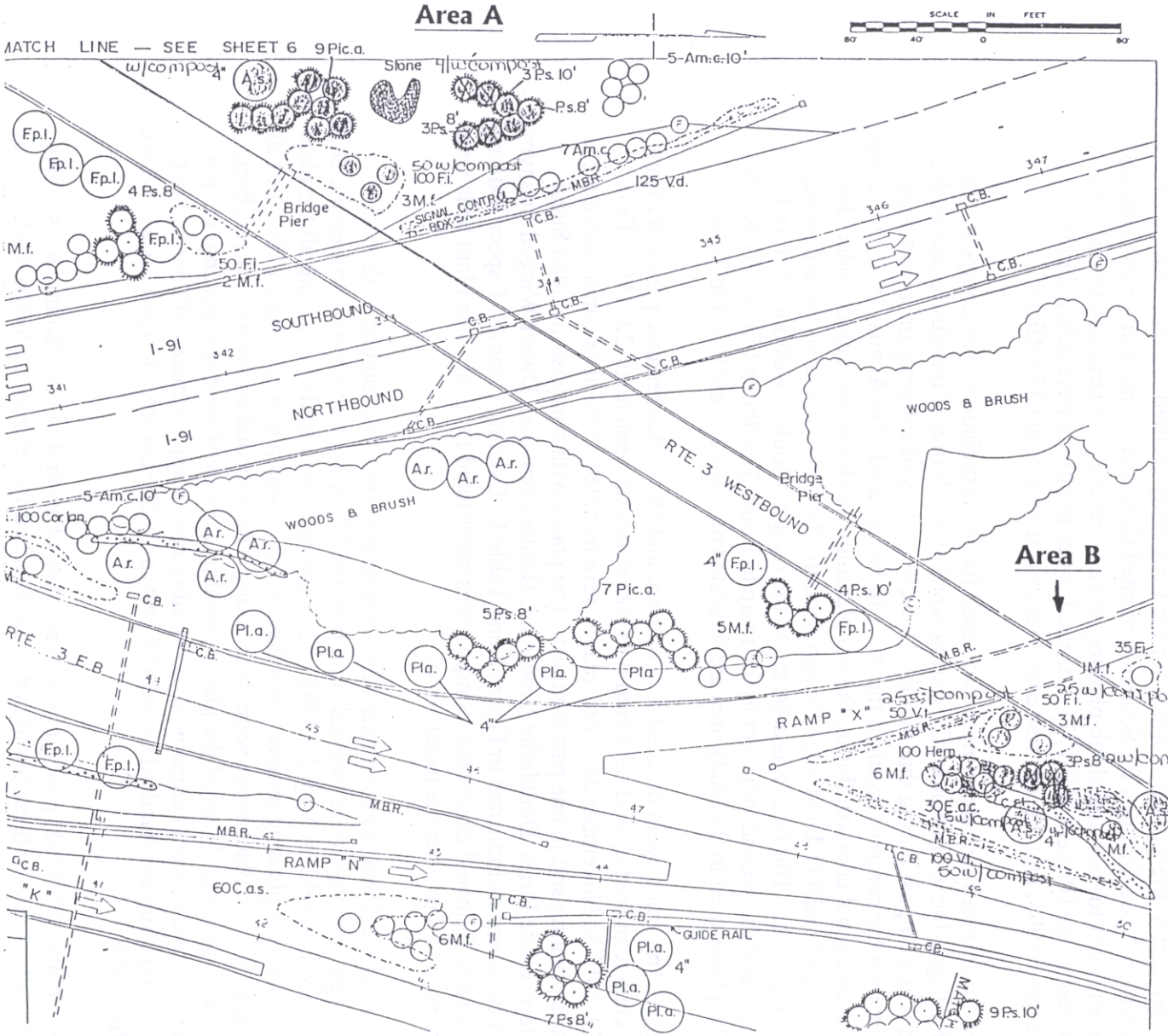


Figure 1
Project Plantings

The project is considered to be a success. July 1998 ConnDOT Supplemental Specifications contain revisions that allow compost to be substituted for peat on any ConnDOT construction project designed after that date.

Table 1
Plant List for Project No. 159-177

Key	Botanical Name	Common Name	# Planted with Compost	
			Area A	Area B
A.s.	Acer saccharum	Sugar Maple	1	1
Am.c.	Amelanchier Canadensis	Shadblow Serviceberry	0	0
F.i.	Forsythia intermedia	Border Forsythia	50	25
E.a.c.	Euonymus alatus compactus	Dwarf Winged Euonymus	0	15
M.f.	Malus floribunda	Japanese Flowering Crabapple	0	0
P.s.	Pinus strobus	Eastern White Pine	4	2
Pic.a.	Picea abies	Norway Spruce	0	0
V.d.	Viburnum dentatum	Arrowwood Viburnum	0	0
V.t.	Viburnum tomentosum	Doublefile Viburnum	0	75
Hem.	Hemerocallis	Daylily	0	0
My.p.	Myrica Pennsylvanica	Northern Bayberry	0	30

Photo #1. Overview of Planting Area Where Compost was Used. (I-91 North to Route 3 East)

Photo #2. Dwarf Winged Euonymus with Compost (The Crab Apple Trees Do Not Contain Compost)

Photo #3. 10 ft Eastern White Pine with Compost (I-91 South to Route 3 West)

APPENDIX A

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
STANDARD SPECIFICATIONS FOR ROADS, BRIDGES AND INCIDENTAL CONSTRUCTION

SECTION 9.49
FURNISHING, PLANTING and MULCHING TREES, SHRUBS, VINES and GROUND COVER PLANTS

9.49.01--Description: The work under these items shall consist of furnishing, planting and mulching trees, shrubs, vines and ground cover plants of the type and size indicated on the plans or special provisions. It shall also include all incidental operations, such as the care of the living plants and the replacement of dead and unsatisfactory plants or unsatisfactory materials before final acceptance of the contract.

9.49.02--Materials: The material for this work shall conform to the requirements of Section M.13.

9.49.03--Construction Methods: Construction methods shall be performed in accordance with these specifications.

The Contractor is cautioned that within the limits of any project, buried cable for illumination or utilities, which may be energized, may be present.

1--Planting Season: Unless otherwise shown on the plans or directed by the Engineer, the planting seasons shall be those indicated below. No planting shall be done in frozen ground or when snow covers the ground, or the soil is otherwise in an unsatisfactory condition for planting.

Deciduous Material

Spring: March 1st to May 1st (inclusive) except for balled and burlapped material, the planting of which will terminate on May 15th.

Fall: From October 15th until the ground freezes. Such plant items, as may be designated elsewhere in the contract documents, shall be planted in the spring planting season only.

Evergreen Material

Spring: March 1st to June 1st (inclusive).

Fall: August 15th to October 1st (inclusive).

2--Protection: Plants received by the Contractor shall be kept moist, fresh and protected against exposure to sun, wind and freezing temperatures whether in the receiving yard, in transit, while being handled or in temporary storage on the job site awaiting planting. Bare-root plants, which are not planted immediately upon receipt, shall be heeled-in in trenches with the bundles opened, the plants separated and all roots covered so as to leave no air spaces. Balled and burlapped plants shall have their earth balls covered by earth, wood chips, cloth, straw or other suitable material which shall be kept moist.

3--Layout: Plant material locations and bed outlines will be staked on the project site by the Engineer-Designer or his designee in the presence of the Contractor, or his representative, before any plant pits or beds are excavated. Request by the Contractor for the staking of the plant layout shall be at least 48 hours, excluding weekends and holidays, prior to the date he wishes to have the layout staked. Labor, equipment and new, smooth stakes of approved quality are to be furnished by the Contractor for this purpose.

4--Excavation: Excavation for planting beds and pits shall conform to the approved staked locations and outlines. The latter shall be neatly formed by means of spades or other approved tools. All sod, weeds, roots and other objectionable

material excavated from the plant beds or pit sites which are unsuitable for backfill shall be removed from the site immediately and disposed of by the Contractor in a manner satisfactory to the Engineer.

The Contractor at his option may apply, prior to excavating plant pits in designated planting bed locations, at no expense to the State, a post-emergent aqueous spray treatment of Glyphosate (isopropylamine salt of glyphosate) 41 percent acid equivalent (ae) to the existing bed vegetation in accordance with the manufacturer's recommendations for perennial vegetation control, instead of excavating the planting bed.

A minimum of fourteen (14) days post application, or when the perennial species shows the visible effects of the treatment, the Contractor shall mow, at no expense to the State, all treated bed areas to a maximum height of 100 mm.

Plant pits may then be excavated, and the excavated soil and vegetative debris shall then be immediately removed from the project site.

In planting bed areas following the excavation of the pits, but before the installation of plant material, the remaining turf grasses and unwanted vegetation shall be sprayed, unless otherwise directed by the Engineer, with Glyphosate at the manufacturer's recommended rate.

5--Pits: Size of pits, in earth excavation, shall bear the following relation to the spread of the roots (or the diameter of balls) of the plants to be planted in them:

Pit diameters shall be twice the rootspread up to and including a 600 mm rootspread.

Pit diameters shall be 600 mm greater than that for rootspreads of from 600 mm to 1200 mm.

Pit diameters shall be one and one-half times the rootspread diameter for rootspreads of over 1200 mm.

The depth of all pits shall be adequate to permit a minimum of 300 mm of soil backfill under all roots or balls. Pits for vines shall be at least 250 mm in diameter and 250 mm in depth.

Any excavation in excess of that required shall be replaced with planting soil.

6--Obstructions Below Ground: Any rock or underground obstruction shall be removed to the depth necessary for planting as specified, unless other locations for the planting are approved by the Engineer.

7--Preparation of Backfill: The planting soil shall be delivered to the project site and stockpiled. The peat shall be delivered to the project site in containers conforming to Subarticle M.13.07-13. The planting soil and peat shall be thoroughly mixed on the project site, in the presence of the inspector, at the rate of one part of peat to two parts of planting soil.

8--Setting Plants: All plants shall be set plumb and at such a level that after settlement they bear the same relation to the surrounding ground as they bore to the ground from which they were dug. Backfill material for all plants shall be thoroughly and properly settled by firming or tamping. Thorough watering shall accompany backfilling unless otherwise approved. Saucers capable of holding water shall be formed about individual plants (exclusive of plant beds) by placing ridges of planting soil around each, or as directed by the Engineer.

Balled or burlapped plants shall be carefully placed in the prepared pits so that the balls rest on the backfill material. Planting soil and peat backfill shall then be filled in around the plant ball and thoroughly tamped. The remaining burlap around the ball shall then be loosened and spread out away from the plants or cut away and removed. Such roots as may have been wrapped around the ball and contained within the burlap shall be straightened and the remainder of the pit filled with tamped planting soil and peat mixture, making certain that no air pockets remain. The bare roots plants shall be properly spread out in a natural position and planting soil and peat backfill carefully worked in among them. All broken or frayed roots shall be cleanly cut off.

9--Fertilizing: Shrub beds shall be fertilized at the rate of 1.3 kg per 9 m^2 of surface area (broadcast). The fertilizer shall be uniformly applied to the surface of the beds and worked into the upper 50 mm of soil. Individual trees shall be fertilized at the rate of 1 kg per 25 mm of trunk diameter, and the fertilizer shall be mixed into the upper 50 mm of soil.

A second application of fertilizer shall be applied to all plant items at the same specified rates over the wood-chip mulch at the end of the period of establishment.

10--Watering: All plants shall be watered within 48 hours after planting if conditions warrant, and as many times thereafter as ordered by the Engineer. At each watering, the
soil around each plant shall be thoroughly saturated. All plants shall be watered at least once a week from April 1st to October 1st, inclusive, or as directed by the Engineer.

11--Guying and Staking: Immediately after planting, trees shall be guyed or staked as shown on the planting detail sheet of the plans, or as directed by the Engineer.

12--Wrapping: Wrapping shall be placed around all trunks of deciduous trees 50 mm or more in caliper or as directed by the Engineer. The wrapping shall start at the base of trees, shall cover the entire trunk surfaces, and shall terminate at the first branches. The wrapping shall be tied at top, bottom, and at intervals of not more than 600 mm. Wrapping shall be done at the time of planting but not before inspection of the plant.

13--Pruning: As directed by the Engineer, plants shall be pruned at the project site before or immediately after planting in accordance with the best horticultural practice. No leader shall be cut unless directed by the Engineer. Broken, or badly bruised branches, sucker growth, etc., shall be removed with clean cuts. Cuts over 20 mm in diameter shall be painted with tree wound paint.

14--Spraying: Spraying with antidesiccant shall be at the Contractor's discretion and as approved by the Engineer at no additional cost to the State.

15--Mulching: Following the plant material installations woodchip mulch (or gravel mulch when specifically called for on the plans or in the special provisions) shall be hand placed and spread to a depth of 100 mm and raked to an even surface over all saucer areas for individual trees and shrubs and over the entire area of shrub beds and elsewhere as directed.

16--Repair: Repair of existing grass areas damaged by the Contractor in the progress of his work shall be the responsibility of the Contractor, who shall restore the disturbed areas to their original condition at no additionalexpense to the State.

17--Establishment Period: The acceptability of the plant material furnished and planted shall be determined at the end of a period of establishment during which period the Contractor shall, as necessary, employ all possible means to preserve the plants in a healthy and vigorously growing condition to insure their successful establishment.

During this period, the Contractor shall water, cultivate, prune the plants, and repair, replace or readjust guy wires, stakes, posts and flagging, as may be required or as ordered by the Engineer. He shall reshape plant saucers, repair washouts and gullies, replace lost wood-chip mulch, keep all planting sites free from weeds, and do other work necessary to maintain the plants in a healthy growing condition. This shall include seasonal spraying with approved insecticides or fungicides as may be required.

All dead or rejected plants shall be promptly removed from the project during the period of establishment, and shall be replaced by the Contractor in kind, quantity and size with live, healthy specimens planted during the stipulated planting season.

The establishment period does not begin until all plant materials stipulated in the contract have been planted. When the plant establishment period begins at the end of the spring planting season, an inspection to determine the acceptability of plant establishment will be held by the Contractor and the Engineer no later than November 1st in the same year. When the plant establishment period begins at the end of the fall planting season an inspection to determine the acceptability of plant establishment will be held by the Contractor and the Engineer by August 1st of the following

year. During the plant establishment inspection, an inventory of losses and rejected materials will be made and corrective and necessary clean up measures will be determined.

Replaced plant material shall be subject to all the requirements specified for the original material.

A final inspection will be held in accordance with Article 1.08.12. Any further work to be done will be in accordance with Article 1.08.13 before the project can be accepted.

9.49.04--Method of Measurement:

1--Planting: The quantity for which payment will be made will be the number of each size and kind of plants counted in place, planted and accepted.

2--Mulching: This work will be measured for payment by the number of square meters surface measurement of the specified thickness for the area on which woodchip mulch (or gravel mulch) has been completed and accepted.

9.49.05--Basis of Payment:

1--Planting: Payment for this work will be made at the contract unit price each for the kind and size of plant and method of planting, as the case may be, completed and accepted in place, except that when approved, partial payment for work satisfactorily performed in the excavation of plant pits and for furnishing and placing planting soil and peat humus admixture may be made in amounts not to exceed twenty (20) percent of the unit bid price for the respective plant.

2--Mulching: This work will be paid for at the contract unit price per square meter for woodchip mulch (or gravel mulch) complete in place.

3--The unit prices shall include all materials, equipment, tools, labor, transportation, operations and all work incidental thereto, except that payment for excavation of solid ledge rock, concrete pavement and boulders 0.5 m^3 in volume or greater will be made under item for "Rock Excavation for Planting."

Pay Item	Pay Unit
(Caliper) (Deciduous Tree Name)	EA.
(Height) (Evergreen Tree Name)	EA.
(Size) (Shrub Name)	EA.
(Size) (Broad-leaved Evergreen Name)	EA.
Vines (Name)	EA.
Groundcover (Name)	EA.
Wood Chip Mulch	m^2
Gravel Mulch	m^2
Spraying Glyphosate	m^2

SECTION M.13
ROADSIDE DEVELOPMENT

M.13.01--Topsoil:

The term topsoil used herein shall mean a soil meeting the soil textural classes established by the United States Department of Agriculture Classification System based upon the proportion of sand, silt, and clay size particles after passing a 2 millimeter (mm) sieve and subjected to a particle size analysis. The topsoil shall not contain less than six (6) nor more than twenty (20) percent organic matter as determined by loss-on-ignition of oven dried samples dried at 105 degrees centigrade.

The following textrual classes shall be acceptable:

Loamy sand, including coarse, loamy fine, and loamy very fine sand
Sandy loam, including coarse, fine and very fine sandy loam
Loam
Silt loam, with not more than sixty (6) percent silt

The topsoil to be furnished by the Contractor shall be loose and friable and free from refuse, stumps, roots, brush, weeds, rocks and stones over 30 mm in diameter. The Topsoil shall also be free from any material that will prevent the formation of a suitable seed bed or prevent seed germination and plant growth.

The Contractor shall notify the Engineer of the location from which he proposes to furnish topsoil to the project at least 15 calendar days prior to delivery.

The topsoil and its source shall be inspected and approved by the Engineer before the material is delivered to the project. Any material delivered to the project which does not meet specifications, or which has become mixed with undue amounts of subsoil during any operation at the source or during placing and spreading, will be rejected and shall be replaced by the Contractor with acceptable material.

When topsoil is not furnished by the Contractor, it shall be material that is stripped under roadway excavation items, or is furnished by the State from areas adjacent to the project, and shall meet the above specifications.

2--Planting Soil: Soil Material to be used for plant backfill shall be one of the following textural classes:

Loamy sand, with not more than 80 percent sand

Sandy loam

Loam

Silt loam, with not more than 60 percent silt

Clay loam, with not more than 30 percent clay

Sandy clay loam, with not more than 30 percent clay

Planting soil shall be made loose and friable, shall be free from refuse, stumps, roots, brush, weeds, rocks and stones 50 mm in diameter. The material shall also be free from any material that will prevent the proper planting of the plant material, or prevent the growth of plants.

(a) For ericaceous plants and broad-leaved evergreens requiring an acid soil, planting soil shall have a true pH of 4.5 to 5.5. If it has not, it shall be amended by the Contractor at his own expense to the proper pH range by mixing with sulphur.

(b) Planting soil for general planting of nonacid-loving plants shall have a true pH value of 5.6 to 6.5. If it has not, it shall be amended by the Contractor at his own expense to the proper pH range by mixing with dolomitic limestone.

The amount of either sulphur or limestone required to adjust the planting soil to the proper pH range (above) shall be determined by the Engineer on the basis of agronomic tests. The limestone shall conform to the requirements of Article M.13.02. The sulphur shall be commercial or flour sulphur, unadulterated, and shall be delivered in containers with the name of the manufacturer material, analysis and net mass appearing on each container.

The Engineer reserves the right to draw such samples and to perform such tests as he deems necessary to assure that these specifications are met.

APPENDIX B

Four-Year Evaluation Memorandum Report

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

memorandum

COM--09A REV. 2/91 Printed on Recycled or Recovered Paper

subject I-91/Route 3 Interchange, Study of Compost Used with Planting Soil – Four Year Evaluation
Memorandum Report 116(42)-3-01-7

date August 10, 2001

to Project File 175-116 (#42)

from Donald A. Larsen
Trans. Supervising Engineer
Bureau of Engineering and Highway Operations

A field review was made of the plantings originally placed from September to November 1997 at the I-91/Route 3 interchange as part of an evaluation to compare compost amended planting soil and soil amended with peat. This follow-up evaluation represents the field conditions after approximately 44 months (or four growing seasons.)

It became obvious that a number of external factors have affected the growth and mortality of various plants at the project since the first year of installation. It was noted that herbicides placed under guiderails that were within 3 feet of some of the plantings under study, particularly the Doublefile viburnum, may have adversely affected these plants in both the composted and uncomposted areas. It is also speculated that an extremely unusual spring weather pattern during 2001 had an adverse affect on many plants as well. Alternating periods of extreme heat and drought with periods of excessive rains and very cold (including subfreezing) temperatures during April and May caused unusual stress on many plants. An unusually heavy snowfall during the winter of 2000/2001 may have contributed to the mortalities due to high salt concentrations and the weight of plowed snow on top of the plants. It was also observed that some shrubs were accidentally cut down as a result of infield maintenance, and some were missing and presumably stolen. Healthier plants were primarily observed further toward the infield of both installations, most likely a result of moister soil and increased distance from roadside disturbances.

The table below indicates the condition of the various plantings observed on August 1, 2001.

Condition of Plantings on August 1, 2001, I-91/Route 3, Wethersfield

	COMPOST (2:1 planting soil and compost)				NO COMPOST (2:1 Planting soil and peat)			
AREA B Southern exposure	Dead	Alive	Missing*	Percent Mortality	Dead	Alive	Missing*	Percent Mortality
Doublefile viburnum	6	52	13	12	15	55	5	30
Forsythia	0	25	0	0	0	25	0	0
Eastern White Pine	1**	1	0	50	0	1	0	0
Sugar Maple	0	1***	0	0	0	1	0	0
Dwarfed Wing Euonymus	0	15	0	0	0	15	0	0
Northern Bayberry	2	28	0	7	2	28	0	7
AREA A Northern Exposure	Dead	Alive	Missing*	Percent Mortality	Dead	Alive	Missing*	Percent Mortality
Sugar Maple	0	1	0	0	0	0	0	0
Forsythia	0	50	0	0	1	49	0	2
Eastern White Pine	0	4	0	0	0	2	1	0

*Missing = Destroyed by lawn mowing, accidents or stolen
** Could have been killed by salt runoff or lack of water.
*** Trunk visibly damaged by lawn mower

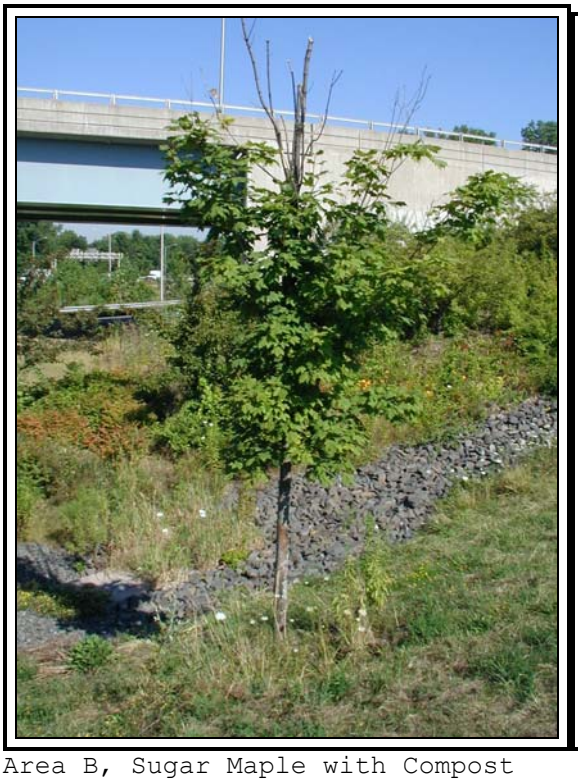
As can be observed in the table, it is difficult to draw conclusions about the effectiveness of the compost for the period from September 1998 through August 2001. In a previously published report it was reported that 40 percent of the plantings that did not contain compost had to be replaced during the first growing season by the contractor. Therefore, we are now comparing 4-year-old plants with compost against three-year-old replacements for 40 percent of the cases. In addition, the other factors mentioned above have affected plants as well.

It may be safe to conclude that the benefits of compost are gained primarily during the first 2 years. At some interval the compost and soil mix may be decayed to the point that little advantage remains. The composts ability to hold water and provide some nutrients is likely very beneficial during the first growing season, especially if inadequate rainfall occurs during that period. Overall, the compost-amended soil appears to have been beneficial to this project.

Photos of some of the plants and trees were obtained during the field visit on August 1, 2001, and are given below. No further future evaluations will be performed.

Area A, Eastern White Pines with Compost

Area B, Doublefile Viburnum, both with and without compost.



Area B, Sugar Maple with Compost

Area B, Sugar Maple Trunk Damage

NOTE: All Photos courtesy of Ms. Kathy Alexander, Conn. Dept. of Env. Prot.

Donald A. Larsen/sh/I-91 Plantings 2001 Survey
cc:
Keith R. Lane - File Misc. Minor Research (#42)
James M. Sime
Donald A. Larsen
Kathy Alexander
Kathy Wynkoop