

**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 USDA 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 textural 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 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.

M.13.02--Agricultural Ground Dolomitic Limestone: Agricultural ground dolomitic limestone shall conform to the standards of the Association of Official Agricultural Chemists, and must comply with all existing State and Federal regulations.

The material must comply with the following gradation:

Square Mesh Sieves	Percent Passing By Mass
Pass 2.0 mm	100
Pass 850 μ m	90
Pass 150 μ m	40
The minimum calcium carbonate equivalent shall be	90

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

M.13.03--Fertilizer: Fertilizer shall be commercial grade granular 10-10-10 fertilizer. The fertilizer shall be delivered to the project in new, clean, sealed containers which bear a label fully describing the contents, the chemical analysis of each nutrient, the fertilizer grade, the net bulk, the brand, and the name and address of the manufacturer. The fertilizer and labels shall conform to all existing State and Federal regulations, and shall meet the standards of the AOAC International.

The delivery of each shipment of fertilizer to the project shall be accompanied by a properly executed and acceptable affidavit of the form shown herein. The affidavit shall be submitted to the Engineer. The Engineer reserves the right to draw such samples and perform such tests as may be deemed necessary to insure compliance with these specifications.

Form for Affidavit--Fertilizers (Official Stationery of Supplier)

Date

To Whom It May Concern:

I hereby certify that I have sold and delivered
tons of commercial fertilizer ofgrade. This
material is designated as our batch number(s)
and was delivered tofor
(Contractor's Name)

Connecticut Department of Transportation Project number(s)

.....

at, Connecticut. The material was
delivered on The labels and contents
meet all State and Federal regulations.

(List analyses of each major plant nutrient as percent
by mass.)

Signature
Company Official

Signature of Seal.....

Notary Public

Should the material fail to conform with these specifications, the Contractor shall supply additional acceptable material and perform such work necessary to rectify the deficiencies without cost to the State.

M.13.04--Seed Mixtures: (a) The grass seed mixture shall conform to the following:

<u>Species</u>	<u>Proportion By Mass (kilograms)</u>	<u>Minimum Purity (Percent)</u>	<u>Minimum Germination (Percent)</u>
CHEWINGS FESCUE, (<u>FESTUCA RUBRA VAR. COMMUTATA</u>) CERTIFIED VARIETY: JAMESTOWN, ATLANTA, VICTORY, SHADOW OR EQUAL CERTIFIED VARIETY; NAME THE VARIETY	15.9	97	80
HARD FESCUE, (<u>FESTUCA LONGIFOLIA</u>) CERTIFIED VARIETY: RELIANT, SPARTON, SCALDIS OR EQUAL CERTIFIED VARIETY; NAME THE VARIETY	13.6	96	85
COLONIAL BENTGRASS, (<u>AGRASTIS TENUIS</u>) CERTIFIED VARIETY: HIGHLAND OR EQUAL CERTIFIED VARIETY; NAME THE VARIETY	2.3	95	90
BIRDSFOOT TREFOIL, (<u>LOTUS CORNICULATUS</u>) VARIETY ARVENIS, CERTIFIED VARIETY: EMPIRE OR EQUAL LOW GROWING VARIETY; NAME THE VARIETY	4.5	96	90
PERENNIAL RYEGRASS, (<u>LOLIUM PERENNE</u>) TRUF TYPE, CERTIFIED VARIETY: NAME THE VARIETY	9.1	98	90

The Birdsfoot Trefoil will be inoculated before planting. Under no circumstances should annual Ryegrass, Italian Rye, or any other seed be added to the seed mixture.

(b) The "temporary" grass seed shall be perennial ryegrass (*Lolium perenne*) or an improved variety thereof, such as Manhattan, having a minimum purity of 98 percent and a minimum germination of 90 percent.

The seed mixture shall be delivered in new, clean, sealed containers. Labels and contents shall conform to all State and Federal regulations. Seed shall be subject to the testing provisions of the AOSA.

The seed shall be delivered to the project accompanied by a properly executed affidavit for each type and shipment of seed. The affidavit shall be of the form shown herein. The Engineer reserves the right to take such samples and to make such tests as he may deem necessary to insure compliance with these specifications. The Contractor shall supply such additional acceptable material and perform such work as required to rectify any deficiencies without cost to the State.

Form for Affidavit--Seed (Official Stationery of Supplier)

Date

To Whom It May Concern:

I hereby certify that kg of seed mixture, lot number, (Label attached) has been sold and delivered to for (Contractor's Name)

Connecticut Department of Transportation Project number(s)

.....

at....., Connecticut. The material was delivered on The labels and contents meet all State and Federal regulations. The mixture consists of:

(State component parts, proportions, minimum purity, minimum germination)

Company Official Signature

Signature and Seal..... Notary Public

M.13.05--Mulch Materials:

1--Wood Chips: Wood chips shall be obtained from sound, green wood, and shall be 3 mm nominal thickness with not less than 50 percent of the chips having an area of not less than 650 mm², nor more than 3900 mm². The material shall be free from rot, leaves, twigs, shavings, debris, and any material injurious to plant growth.

2--Hay: Hay shall be from acceptable grass or legume mowings, free from weeds, reeds, twigs, debris or other objectionable material. It shall be free from rot or mold, and shall have a moisture content of not more than 15 percent when delivered to the project. No salt hay shall be used.

3--Wood Fiber Mulch: Wood fiber mulch or wood cellulose fiber mulch shall be material manufactured for mulching seeded areas. The material may be made from coniferous or hardwood trees. It shall be free from shavings, rot, mold, foreign material or debris. It shall be of uniform texture. It may contain a nontoxic marking dye. The moisture content of the material when delivered to the project shall not be more than 12 percent by mass. It must be material capable of forming a homogeneous slurry when mixed in water. It shall be delivered to the project in clean, new, sealed containers bearing the brand, net mass, and name and address of the manufacturer.

The Engineer reserves the right to draw such samples and perform such tests on any mulch material as deemed necessary to assure that the material meets all requirements.

M.13.06 ---Compost: Compost shall be a stable, humus-like organic material produced by the biological and biochemical decomposition of source-separated compostable materials, separated at the point of waste generation, that may include, but are not limited to, leaves and yard trimmings, food scraps, food processing residuals, manure and/or other agricultural residuals, forest residues and bark, and soiled or non-recyclable paper. Compost shall not be altered by the addition of materials such as sand, soil and glass. Compost shall contain no substances toxic to plants and shall not contain more than 0.1 percent by dry mass of man-made foreign matter. Compost shall pose no objectionable odor and shall not closely resemble the raw material from which it was derived. Compost shall have a minimum organic matter content of 30 percent dry unit weight basis as determined by loss on ignition in accordance with ASTM D 2974. Compost shall be loose and friable, not dusty, have no visible free water and have a moisture content of 35 - 60 percent in accordance with ASTM D 2974. The particle size of compost shall be 100 percent less than 25 mm in accordance with AASHTO T27 and shall be free of sticks, stones, roots or other objectionable elongated material larger than 50 mm in greatest dimension. The pH of compost shall be in the range of 5.5 - 8.0. The maturity of the compost shall be tested and reported using the Solvita Compost Maturity Test and must score 6 or higher to be acceptable. The soluble salt content of compost shall not exceed 4.0 mmhos/cm as determined by using a dilution of 1 part compost to 1 part distilled water. Compost may be either commercially packaged or used in bulk form. All compost shall be from DEP regulated, permitted or approved facilities. All compost material must be environmentally acceptable and must be accompanied by a Materials Certificate and Certified Test Report in accordance with Section 1.06.07. The Engineer reserves the right to draw samples and perform tests as may be deemed necessary to assure that the material conforms to these specifications.

M.13.07--Plant Materials: The materials for this work shall conform to the following requirements:

1--General: For the most part, "Standardized Plant Names," 1942 edition prepared by the Editorial Committee of the American Joint Committee on Horticultural Nomenclature, shall be the authority for all botanical plant names.

All plants shall be first-class representatives of their normal species or varieties. They shall have well-furnished branch systems together with vigorous fibrous root systems.

Plants shall be free from all insect pests, plant diseases, disfiguring knots, stubs, sun-scalds, abrasions of the bark or any other form of injury or objectionable disfigurements. All plant material shall comply with the State and Federal laws with respect to inspection for plant diseases and insect infestations.

Plants shall not be pruned before delivery and no plants shall be cut back from larger sizes to meet the sizes specified.

Plants shall be nursery grown unless otherwise specified and bear evidence of proper nursery care, including adequate transplanting and root-pruning.

No plant will be considered to be nursery grown unless it has been growing in a nursery for at least two years and unless it has been root-pruned or transplanted no more than five years prior to digging.

2--Nursery-Grown Plants: Nursery-grown plants shall conform with the requirements as specified in the current edition of "U.S. American Standards for Nursery Stock," or as further specified in the plans. Nursery-grown trees shall have no cuts which are not healing, no cuts over 19 mm in diameter which have not completely calloused over and no abrasions of the bark. They must have good fibrous root systems characteristic of the kind.

Trees shall have straight trunks, well-balanced tops and a single leader or as may be characteristic of the species.

Trees in which the leader or branches have been cut back or otherwise topped or dehorned will not be accepted. The caliper of shade trees up to and including 100 mm in diameter shall be measured above the root collar (or swelling at the ground) 150 mm above ground level. Caliper shall be the determining measurement in grading. Height measurements shall be given in half meters in sizes up to and including 2 m (e.g. 1.5-2 m) and single meters in larger sizes (e.g. 2-3 m).

Small deciduous trees shall be completely natural. Tree "clumps" shall have three or more main stems starting from the ground. Bush from trees shall be those with branches which start from the main trunk close to the ground in the manner of a shrub.

Vines and groundcover plants shall be well-furnished with vigorous root systems. They shall be field-grown unless otherwise specified. Plants grown in pots or bands shall have sufficient roots to retain the soil in which they are growing when such plants are removed from their containers. However, such plants shall not be root-bound.

3--Collected Plants: Collected plants specified to be collected from a natural environment, or from a site where they were planted as seedlings or transplants and where they may not have received subsequent care, shall be clean, sound stock free from any form of injury. The quality of balled and burlapped (B & B) trees and shrubs shall be identical with that specified for nursery-grown B & B and balled, burlapped and platformed (BB & P) material.

Preference will be given to plants which have been previously transplanted or root-pruned at sufficiently frequent intervals to have developed a fibrous root system as follows:

(a) No tap root shall be present.

(b) The majority of lateral roots extending beyond the dimensions of the ball shall be fibrous or pliable enough to allow combing out and saving. (This means that said roots must be pliable enough to bend around the ball of the plant without breakage or rupture).

A lateral root over 19 mm in diameter at its protrusion beyond the dimension of the ball shall not be considered pliable enough to save.

The length of the majority of lateral roots protruding beyond the ball shall not be greater than will allow the smallest fibrous rootlets at their tips to be saved. Lateral roots, which extend beyond the ball more than approximately one-half the given diameter of the ball, shall not be considered practical to save.

Root-pruning shall consist of the complete severance of the bottom tap roots and side roots. No plant will be accepted if it has not completely recovered from the shock of its last root pruning. (Recovery may take one or more growing seasons).

Plants not meeting these transplanting and root-pruning requirements, but acceptable to the State in all other particulars as to size and quality, may be accepted, provided the diameter of the ball furnished is at least one-third greater than that specified above for nursery-grown plants of the same kind and size, or as the Engineer may specifically direct in writing. The specified dimensions for the size of ball shall not be decreased except in specific cases and only by special permission of the Engineer.

Plants specified as clumps shall be collected from good soil which has produced a fibrous root system typical of the nature of the plant. The clumps shall be dug with earth and incidental vegetation adhering to the roots.

4--Inspections: All plants shall be subject to inspection by the Engineer. The Contractor shall designate his wholesale plant material source(s) of supply to the Engineer in writing at least one month in advance of each planting season to facilitate an orderly and timely inspection of the items to be installed. The Contractor shall be represented during such inspection. Inspection may be made at the nursery, plantation, or collecting field by the Engineer. The Department reserves the right to make inspections outside the State of Connecticut, at all contractor designated plant material sources of supply.

Further inspections will be made when the materials are delivered to the project site or storage area. All tagged samples shall be delivered to the project for which they were sampled. All deliveries to the planting site shall be accompanied by both the vendor's invoice, designating kind, size, quantity and sources of supply and certificates of inspection in accordance with M.13.07-8 (Certificates of Inspection). The State reserves the right to inspect all plant materials at the growing sites.

5--Substitutions: No change in size, kind or quality of plants from those specified will be permitted without written approval of the Engineer. The Contractor shall submit a written request for permission to make a substitution. Upon receipt of this letter, the Engineer will suggest plants meeting the requirements of the contract as to function, size and type and indicate the reduced cost to the State as the result of said substitution. In no case shall the price for substitutions exceed the bid price of those replaced.

The Engineer may approve, on the basis of unavailability, the substitution of plantation-grown or collected plant materials for specified nursery -grown materials at price reductions of 10 percent and 20 percent respectively below the contract unit bid price to the State.

Plantation-grown stock are plants which have been systematically set out in clean, open, tillable, agricultural soil, but where a minimum of aftercare has been carried out.

Collected stock are plants of natural origin (not planted by man) with little or no subsequent care.

6--Digging Plants: Plants shall be dug immediately before shipment. Special precaution shall be taken to avoid any unnecessary injury to or removal of fibrous roots. Damaged roots shall be cut off clean. No cold storage plants will be accepted unless authorized by the Engineer.

(a) After deciduous bare -root plants are dug, their roots shall be protected from exposure to sun, wind and freezing temperatures. All bare roots of trees, shrubs and vines, unless otherwise directed, shall be puddled in a wet clay mixture which will cover and adhere to the entire root system. Bare roots shall be further protected by wrapping them in wet straw, moss, burlap or other suitable material, or by heeling them in and watering them in order to keep them fresh and viable.

(b) Balled and burlapped plants shall be lifted so as to retain as many fibrous roots as possible. All B & B plants must come from soil which will hold a firm ball. The latter shall be wrapped with burlap, or similar approved material, and tightly laced in such a manner as to hold the balls firm and intact. All B & B material arriving with broken or loose balls, or with manufactured balls, will be rejected.

7--Transportation and Labelling: Plants transported by open vehicles shall be covered by tarpaulins or other suitable covers securely tied to the body of the vehicle. Closed vehicles shall be adequately ventilated to prevent overheating of the plants. The heads of trees shall be tied in carefully to prevent breakage of the leaders and the branches. Trunks and branches shall be adequately supported on padding to prevent their being scraped or bruised.

Legible labels shall be attached to all separate plants, boxes, bundles, bales or other plant containers, indicating the name, size, and quantity of units in each container and other information necessary for inspection.

8--Certificates of Inspections: Certificates of inspections, issued by Federal or State authorities (or both) attesting to the freedom of the plant material from diseases and insect infestations, shall accompany each shipment, invoice or order of stock. On arrival of shipment, such certificates shall be filed with the Engineer.

9--Delivery: Notice of delivery of plants shall be given to the Engineer by the Contractor at least 48 hours in advance of the anticipated delivery date, unless otherwise authorized. The Engineer shall be furnished a legible copy of the invoice for each shipment showing kind, sizes and quantities of materials.

All plant materials which are delivered in such a stage as to reasonably endanger their survival will not be accepted.

All plant materials shall be produced in a latitude north of Washington, D.C. and in a longitude east of the Mississippi River.

10--Spring Planting: All deciduous plants shall be received with buds unopened and intact; evergreen plants with the new growth retarded.

11--Fall Planting: Deciduous plants shall not be dug before the plants have hardened off.

12--Water: Water shall be free from oil, acid, alkalis, salts and any other substances harmful to plants. Water from streams shall not be used unless authorized by the Engineer.

13--Peat:

(a) Peat shall be commercially packaged peat from sedge, sphagnum or reed sources. Material shall be in such physical condition that it may be rudded through a 12.5 mm mesh screen, and may be readily mixed with soil material. It shall be free from sticks, roots, stones and other objectionable material. It shall be delivered to the project in clean, new, sealed containers bearing the brand, net bulk, and name and address of the packer. The material shall have an acidity that falls in the pH range of 3.0 to 7.0. It shall have a minimum organic content of 90 percent and a minimum water-absorbing capacity of 1000 percent. The Engineer reserves the right to draw such samples and perform such tests as may be deemed necessary to assure that the material conforms to these specifications.

(b) Compost conforming to Article M.13.06 may be substituted for peat.

14--Miscellaneous: (a) Anchor stakes for guying trees shall be of sound hardwood with a minimum length of 610 mm and minimum diameter of 50 mm at the smaller end. Stakes made from lumber shall measure no less than 50 mm X 50 mm in section throughout their lengths. Trees over 90 mm in caliper shall require either stakes or deadmen for support as approved by the Engineer. The type of stake used shall be uniform throughout the job.

(b) Tree support posts shall be sawed posts cut to a uniform square cross-section of 50 mm X 50 mm throughout their lengths. They shall be cut from sound, hard, clean, straight wood free from crooks, 2.5 m long for major trees and 1.2 m-1.5 m long for minor trees or as approved by the Engineer.

(c) Hose for protecting the bark of major and minor trees from guy wires shall be of good quality rubber or plastic hose acceptable to the Engineer, with a minimum inside diameter of 9.5 mm and a maximum inside diameter of 19 mm.

(d) Guy wire shall be pliable, new, annealed, galvanized, 12-gage, for staking trees and 10-gage for guying.

(e) Flags shall be white cotton cloth or white plastic ribbon, 50 mm wide and 460 mm long. Gauze is not acceptable.

(f) Tree wound paint shall be waterproof tree paint approved by the Engineer.

(g) Antidesiccant shall be an emulsion such as will provide a film over plant surfaces, permeable enough to permit transpiration. Antidesiccant shall be delivered in containers of the manufacturer and shall be mixed according to the manufacturer's instructions.

(h) Wrapping material for tree trunks shall be treated, laminated tree wrapping paper in rolls, 100 mm wide, or as approved by the Engineer.

(i) Twine for tying wrapping material to trees shall be jute twine not less than 2-ply for trees under 75 mm in caliper, and not less than 3-ply for trees of larger caliper.

M.13.08--Sod: Sod shall be living sod procured from areas where the soil is reasonably fertile and from areas similar in the degree of moisture to the area to be planted. It shall be cut or stripped, by approved methods, from turf areas relatively free of large stones, roots or other materials which might be detrimental to the sodding operation or to future maintenance. The sod shall contain a sufficient proportion of pasture grasses to insure a good mat of roots and a reasonably dense turf unless Type No. 1, which is a superior quality, is specified on the plans.

Any growth more than 75 mm in height shall be mowed to a height of 75 mm not more than five days before the sod is lifted.

Sources of sod shall be made known to the Engineer at least five days before cutting and shall be approved before mowing. The sod shall be cut into squares or rectangular portions which shall be 300 mm wide and may vary in length, but must be of a size which will permit them to be lifted without breaking. The sod shall be sufficiently moist so the soil will adhere firmly to the roots when it is handled and may require watering before lifting. Field grown sod shall be cut to a minimum depth of 38-50 mm. Where Type No. 1 Sod is specified, it shall be cut to a minimum depth of 25-38 mm.

Type No. 1 Sod shall be obtained from inspected and approved commercial sod farm sources of supply and shall be free from noxious weeds, insect infestations, and fungus and bacterial diseases.

M.13.09--Erosion Control Matting: Erosion control matting shall be from the Department's approved material list. Staples shall conform to the Manufacturer's requirements. Material which shows signs of degradation shall not be used and shall be removed from the project.