

SECTION 244—ROADSIDE DEVELOPMENT MATERIALS

244.01—Description

These specifications cover the various materials, such as fertilizers, seeds, plants, sod, and mulch, for use in landscaping and materials used for soil retention to help prevent erosion.

244.02—Detail Requirements

- (a) **Herbicides:** Herbicides shall be registered with the Virginia Department of Agriculture and Consumer Services in accordance with the Virginia Pesticide Law and shall be supplied in the manufacturer's containers clearly labeled as to the composition, brand, and name and address of the manufacturer.

- 1 **Herbicide for control of broadleaf weeds** shall contain at least 3 pounds of 2,4-D as an oil-soluble, water-emulsifiable amine salt. It shall have a shelf life of at least 2 years and shall be homogeneous with slight agitation. The type of amine salt and the actual acid equivalent per gallon shall be shown on the container.
- 2 **Herbicide for stump treatment** shall be dicamba CST and shall be applied in accordance with the manufacturer's registered label.

(b) **Topsoil:**

- 1 **Class A topsoil:** Class A topsoil shall be stockpiled topsoil that has been salvaged in accordance with the requirements of Section 303.04(a). It shall be the original layer of the soil profile formed under natural conditions, technically defined as the "A" horizon or as defined by the United States Department of Agriculture–Natural Resources Conservation Service (USDA–NRCS) Soil Survey Division. It shall be free from refuse and any other materials toxic to plant growth and subsoil, stumps, viable noxious weeds, roots, brush, rocks, clay lumps, or similar objects larger than 3 inches in any dimension.

- 2 **Class B topsoil:** Class B topsoil shall be topsoil furnished from sources outside the project limits and shall be the original top layer of a soil profile formed under natural conditions, technically defined as the "A" horizon or as defined by USDA–NRCS Soil Survey Division. It shall consist of natural, friable, loamy soil without admixtures of subsoil or other foreign materials and shall be free of viable noxious weed seed, plant propagules, brush, rocks or other litter, and rocks greater than 3 inches in any dimension. It shall have demonstrated by evidence of healthy vegetation growing or having grown on it prior to stripping that it is well drained and does not contain substances toxic to plants. The Contractor shall submit a source of materials for topsoil on the project prior to use. The Department reserves the right to reject any topsoil material not complying with the requirements of this specification.

The allowable pH range for Class B topsoil for use in establishing sod or turf shall be 5.5 to 7.0.

Class B topsoil shall be a "sandy loam," "loamy sand," or "sandy clay loam" soil as defined by the USDA Soil Textural Classification System with an organic matter content between 1 and 8 percent or as approved in writing by the Engineer.

- 3 **Testing and documentation:** The Contractor shall submit the following test reports to the Engineer for Class B topsoil prior to use. Testing shall be completed by an independent commercial soils testing laboratory:

- a. **Soil analysis** of topsoil including pH factor, mechanical analysis (composition), salinity, percentage of organic content, and soil classification based thereon.
- b. **Recommendations** on type and quantity of additives required to establish a satisfactory pH and bring the supply of nutrients to a level satisfactory for sustaining turf and/or for use as a soil mix for planting if applicable.

- (c) **Seeds:** Kinds and varieties of seeds shall be delivered to the project in separate sacks bearing a green seed label denoting that the seed was inspected and approved by the Virginia Crop Improvement Association. Open bags will not be accepted for use. Seeds shall be mixed under the observation of the Engineer on the project or at other approved locations. Seeds shall comply with applicable state and federal seed laws and contract requirements. Seed shall not be used until approved by the Engineer.

Seed shall be subject to inspection by Virginia State Seed Regulatory Inspectors of the Virginia Department of Agriculture and Consumer Services.

Seed tests shall be completed within the 9-month period prior to the beginning of the area scheduled seeding period during which the seed is to be used.

Seed shall not be or have been stored in an enclosure where herbicides, kerosene, or other material detrimental to seed germination is stored.

Noxious weed seeds, as defined by the rules and regulations adopted for enforcement of the Virginia Seed Law, will not be permitted. The number of restricted noxious weed seeds shall be not more than the number per ounce or per pound of noxious weed seeds specified in the rules and regulations of the Virginia Seed Law.

The tag from each sack of seed shall be signed by the Contractor and delivered to the Engineer after each sack is completely used.

- (d) **Fertilizers:** Fertilizer shall be uniform in composition, free flowing, and suitable for application with approved equipment. The fertilizer shall be delivered to the project in bags or other convenient containers, each fully labeled, and shall conform to all applicable state and federal laws and regulations. Additional nutrients shall be added only when specified in the contract documents or in accordance with the provisions of Section 109.05. Fertilizer shall be subject to testing by the Virginia Department of Agriculture and Consumer Services. The Department reserves the right to reject fertilizer materials that do not comply with the requirements of these specifications or to be compensated in an amount as decided by the Engineer for failure of complying with the requirements of the Virginia Fertilizer Law. Other fertilizer products and rates may be substituted with the prior written approval from the Engineer.

A copy of the material safety data sheet (MSDS) shall be provided to the Department for each type of fertilizer supplied with each fertilizer delivery. Any fertilizer delivery that is not accompanied by the appropriate MSDS will be rejected.

- 1 **Fertilizer for seeding, sodding, sprigging, and plugging** shall have a guaranteed 1-2-1 ratio and a nitrogen, phosphorous, and potassium (NPK) analysis as detailed in the plans with a minimum 30 percent of the nitrogen from a slow release or slowly soluble source with the remainder of the nitrogen from urea or ammonium nitrate. The following types of slow release or slowly soluble nitrogen fertilizers may be used: urea formaldehyde (UF) (ureaform, methylene urea, and methylene diurea/dimethylene triurea); isobutylidene diurea (IBDU); sulfur-coated urea (SCU); and polycoated urea (PCU). UF products shall have a minimum activity index of 40 percent. The IBDU minimum size guide number shall be 230. All UF and IBDU products shall indicate the slow release/slowly available nitrogen source on the fertilizer analysis label as water-insoluble nitrogen. PCU and SCU shall have a minimum 3-month release duration for the total product. The phosphorous content of the fertilizer shall be triple superphosphate or diammonium phosphate. The potassium content of the fertilizer shall be potassium chloride, commonly known as muriate of potash. Slow release or slowly soluble fertilizers may be applied with a hydraulic seeder except for SCU. Fertilizer shall be applied in accordance with the requirements of Section 603.
 - 2 **Fertilizer for planting plants** shall have a guaranteed 1-2-1 ratio and a 15-30-15 analysis with a minimum of 40 to 50 percent of the nitrogen from one of the following slow release or slowly soluble sources, with the remainder of the nitrogen from urea or ammonium nitrate: soluble UF, SCU, and PCU. The UF products shall have a minimum activity index of 40 percent. SCU and PCU shall have a minimum 3-month release duration for the total product. Slow release or slowly soluble fertilizers shall be applied as a dry surface application as shown in the Department's *Road and Bridge Standards*, Volume II, Landscape Section.
- (e) **Lime:** Lime shall be agricultural grade ground limestone. Agricultural grade pulverized or pelletized lime products may be substituted at no additional cost to the Department.
- 1 The material source shall be registered with and approved by the Virginia Department of Agriculture and Consumer Services in accordance with the Virginia Agricultural Lime Law and shall conform to the requirements of Section 240. All lime shall be subject to testing by the Virginia Department of Agriculture and Consumer Services. Other lime products may be substituted with approval from the Engineer.
- (f) **Inoculating Bacteria for Treating Leguminous Seeds:** Bacteria shall be a pure culture of nitrogen-fixing bacteria selected for maximum vitality. Cultures shall be not more than 1 year old and shall be subject to the approval of the Engineer.

(g) **Mulch:** Mulch shall conform to the following unless otherwise approved in writing by the Engineer:

- 1 **Mulch for seeding** (vegetative) shall consist of dry straw or hay, free from noxious weeds. Mulch shall be reasonably bright in color and shall not be musty, moldy, caked, decayed, or dusty.
- 2 **Wood cellulose fiber mulch for hydraulic seeding** shall consist of specially prepared wood cellulose processed into a uniform fibrous physical state. Mulch shall be dyed green or contain a green dye in the package that will provide an appropriate color to facilitate visual inspection of the uniformly spread slurry. Mulch, including dye, shall not contain germination-inhibiting or growth-inhibiting factors. Mulch shall be manufactured and processed so that it will remain in uniform suspension in water under agitation and will blend with seed, fertilizer, and other additives to form a homogeneous slurry. Mulch shall form a blotterlike ground cover, on application, having moisture absorption and percolation properties and shall cover and hold grass seed in contact with the soil without inhibiting the growth of grass seedlings. Field and equipment performance determinations by the Department shall be prerequisites for the approval of a source of supply for mulch.

The manufacturer shall provide certification that the mulch conforms to the following:

Property	Value
Fiber or particle size	
Length	To approximately 0.39 inch (10 mm)
Thickness or diameter	Approximately 0.04 inch (1 mm)
Net dry weight content (VTM-47)	Minimum stated on bag
pH range (TAPPI T509 or ASTM D 778)	4.0 to 8.5
Ash content (TAPPI T413 or ASTM D 586)	Maximum 7.0%
Water-holding capacity (VTM-46)	Minimum 90%

Mulch shall not contain elements or compounds at concentration levels that will be phytotoxic.

In addition to making field performance determinations, the Department may sample and perform such other tests on mulch to ensure that it conforms to these specifications. Only those materials that have been evaluated by the Department and that appear on its list of approved sources of supply will be accepted.

Mulch shall be delivered in packages of uniform weight bearing the name of the manufacturer, the net weight, and an additional statement of the net dry weight content.

- 3 **Wood chips** processed from clearing and grubbing operations may be used for mulch on seeded areas as directed by the Engineer. Wood chips shall be not more than 3/8 inch in thickness or 6 square inches in area.
 - 4 **Mulch for individual planting pits and planting beds** shall be double-shredded hardwood mulch aged for at least 1 year and brown in color. A representative sample shall be submitted to the Engineer for approval prior to delivery to the work site.
- (h) **Sod:** Sod shall be cultivated material conforming to the requirements of the State Board of Agriculture for state-approved sod or the State Sod Certification Agency for state-certified sod. Root development shall be such that standard size pads will support their own weight and retain their size and shape when suspended vertically from a firm grasp on the uppermost 10 percent of the area. The top growth of sod shall be mowed so that the height of the grass will be 2 to 3 inches at the time of the stripping operation. Sod may be furnished in any standard pad width and length provided the dimensions do not vary from the average by more than 5 percent. Sod shall be machine stripped at a uniform soil thickness of at least 1 inch. Broken, torn, or irregularly shaped pads will be rejected.
- (i) **Trees, Shrubs, Vines, and Other Plants:** The botanical and common name of plants shall be in accordance with the latest edition of *Standardized Plant Names*, prepared by the Editorial Committee of the American Joint Committee on Horticultural Nomenclature in effect on the date of the Notice of Advertisement.
- 1 **Quality and size:** Plants shall conform to the requirements of the current *American Standard for Nursery Stock* (ANSI Z-60.1) by the American Nursery and Landscape Association and these specifications.
Plants shall be representative of their normal species and varieties; shall have well-furnished branch systems and vigorous fibrous root systems characteristic of their respective kinds; shall be

grown in a state-approved, certified nursery; and shall bear evidence of proper nursery care, including adequate transplanting and root pruning. Plants shall comply with state and federal laws governing inspection for plant diseases and insect infestation and shall be free from insect pests, plant diseases, disfiguring knots, stubs, sunscald, bark abrasions, or any other form of damage or objectionable disfigurements.

When a minimum and maximum size or range is specified, an average size shall be furnished. Plants shall not be pruned before delivery or cut back from larger sizes to conform to the sizes specified. Sizes furnished shall be those specified at the time of delivery and before the usual pruning at the time of planting. Nursery-grown trees shall be free from cuts of limbs that are not healed and cuts more than $\frac{3}{4}$ inch that have not completely callused over. Plants from cold storage will not be accepted. Deciduous plants, except those grown in containers, shall be dormant when planted.

- 2 **Digging and protection:** Digging shall be in accordance with the current *American Standards for Nursery Stock* and done in a manner that will avoid damage to or loss of roots, but roots that are cut shall be cleanly cut. Balled and burlapped plants shall be properly dug and protected to preserve the natural earth in contact with the roots. Manufactured balls or processed balls will not be accepted. Balls shall be firmly wrapped and tied with approved materials. Balled plants will not be accepted if the ball is broken, cracked, or loose. After plants are dug, their roots shall be protected from damage. Roots of bare root plants shall be kept moist at all times. Bare root plants shall be further protected by wrapping in wet straw, moss, burlap, or other approved material.
 - 3 **Plantable pots:** In lieu of using burlap with balled plants, plants may be dug as specified herein and placed in plantable pots. Pots shall be constructed of organic, biodegradable material that will readily decompose in soil and shall not be smaller in any dimension than the size specified for balled and burlapped root systems. At the time of planting, the lip or rim of pots shall be broken away, and drainage holes shall be provided as directed. Plants with balls that have been grown in pots or with loose stems will be rejected.
 - 4 **Container-grown plants:** In addition to the requirements of the *American National Standard for Nursery Stock*, container-grown plants shall conform to the following:
 - a. The space between the rim or top of the container and the soil line within the container shall not be more than $1\frac{1}{2}$ inches for the 1-gallon and 2-gallon sizes and not more than $2\frac{1}{2}$ inches for the 5-gallon size.
 - b. Encircling roots shall not have grown in such a manner that they will cause girdling of the trunk or stems.
 - c. Roots shall have been grown in the soil medium for a minimum of 6 months extending to the limits of the container on all sides and from top to bottom.
 - 5 **Collected plants:** Collected plants from wild or native stands shall not be used without the written permission of the Engineer unless specified on the plans. Wild or native plants shall be clean, sound stock and free from injury, and the quality of the plants shall be similar to that specified for nursery-grown material. Stock shall have sufficient root systems to ensure successful transplanting. Balls, when specified, shall be tight and well formed.
 - 6 **Clumps:** Clumps shall be dug from good soil that has produced a fibrous root system typical of the nature of the plant and shall have earth and incidental vegetation adhering to roots.
- (j) **Miscellaneous Planting Materials:**
- 1 **Twine** for wrapping balled and burlapped trees shall be made of an organic material, biodegradable twine, at least two-ply.
 - 2 **Composted yard waste** shall be dark brown or black in color and consist of decomposed leaves, branches, and grass clippings. Prior to delivery, the Contractor shall submit to the Engineer for approval, a sample of the composted yard waste and a test report from an independent laboratory verifying that the material conforms to the following analysis:
 - pH = 5.5 dry–8.0 wet
 - Moisture Content = 35%–45%
 - Particle Size = Pass through a 1-inch screen or smaller
 - Stability = Stable to highly stable, thereby providing nutrients for plant growth
 - Maturity/Growth Screening = Aged (cured) for a minimum of 6 months, reach

thermophilic (113—158 degrees F) temperature ranges following a minimum of two successive turnings of the compost, and pass maturity tests or demonstrate its ability to enhance plant growth

Soluble Salt Concentration = 3.0 dS/m (mmhos/cm) or less

Nutrient Content: Nitrogen = 0.5%–3.5%

Phosphorous = 0.2–4.0%

Potassium = 0.3%–2.0%

Density = Not more than 1,250 pounds per cubic yard.

The Contractor shall submit the following information to the Engineer 30 days prior to the date the compost is shipped to the construction site:

- a. A vendor’s certificate or affidavit attesting that the “Composted Yard Waste” complies with the requirements of this specification.
 - b. A test report from an independent certified laboratory verifying that the material complies with the requirements for use as specified by the Virginia Department of Environmental Quality and United States Environmental Protection Agency/40 CFR Part 503 Regulations February 1993 with regard to heavy metal content and restrictive use of biosolids.
 - c. A 2-gallon sample of the material for visual inspection. In addition, the test report shall indicate that the compost material is free of viable weed seed, plant propagules, and harmful pathogens. Non-organic materials such as concrete, plastic, metal, glass, paper products, chemically treated plywood, plywood, pressboard, and organic pine by-products will not be accepted. The Engineer reserves the right at any time to test and reject compost material that does not comply with the requirements of this specification. Other compost products may be substituted with the written approval of the Engineer.
- 3 **Horticultural Grade Perlite** shall be a fine-to-medium grade, non-organic volcanic mineral identified as Perl-Lome having closed air cells and surface cavities, expanded to form a granular, snow-white material, 5 to 20 times its original volume. Perlite shall have a weight of 5 to 8 pounds per cubic foot. Prior to delivery, the Contractor shall submit to the Engineer for approval, a sample of the perlite and a manufacturer’s test report or product certification verifying that the material complies with the following analysis and gradation:

pH = 6.5 to 7.5

Nutrient Content = Sterile.

Standard Sieve or Micron Size	Perlite Gradation	
	Fine	Medium
+16 mesh	10% maximum	60% maximum
+100 mesh	60% minimum	85% minimum

- 4 **Burlap used for wrapping the tree ball** shall be made of an organic biodegradable material.
- 5 **Water** used in watering plants shall be obtained from fresh water sources and shall be free from chemicals and other toxic substances harmful to plants. Brackish water shall not be used. The source of water will be subject to the approval of the Engineer.
- 6 **Staking and guying materials** shall be 14-gage galvanized steel wire. Hose shall be corded rubber, ½ inch or ¾ inch, and solid green in color. Turnbuckles shall be galvanized steel or zinc-coated steel. Stakes for anchoring trees and shrubs shall be 2 inch by 2 inch rough dressed hardwood in the appropriate length and reasonably free of knots. Trees and shrubs shall be anchored in accordance with Section 1200 of the Department’s *Road and Bridge Standards* unless otherwise indicated on the plans. Other staking, guying, and anchoring methods and materials specifically designed for securing trees and shrubs may be substituted with prior approval in writing from the Engineer or as designated on the plans.
- 7 **Below-ground tree anchors** shall be below-grade steel stabilizers capable of fixing the root ball in place until the tree has established itself in place. Prior to ordering material, the Contractor shall furnish the Engineer manufacturer’s product data for the type of anchoring system he proposes to supply for review.

- 8 **Tree protection tubes** shall be constructed from flexible UV-inhibited polyethylene, polypropylene, or similar material designed to speed photosynthesis, promote seedling growth, and reduce planting stress by trapping moisture, thereby raising relative humidity and ambient temperature inside the tube. Tree tubes shall protect the tree seedlings from animals, wind desiccation, small rodents, chemical sprays, and insects. The design of the tree tubes shall not be detrimental to the establishment and growth of the seedling or young tree. Tree tube designs shall be capable of accommodating tree growth for at least 3 years after planting.

(k) **Soil Retention Coverings:**

- 1 **Jute mesh** shall be a uniform, open, plain weave of undyed and unbleached single layer jute yarn. The yarn shall be loosely twisted and shall not vary in thickness by more than its normal diameter. Jute mesh shall be new, and its length shall be marked on each roll.
Between strands lengthwise, openings shall be 0.60 inch \pm 25 percent. Between strands crosswise, openings shall be 0.90 inch \pm 25 percent. Jute mesh shall weigh 0.9 pound per square yard \pm 5 percent.
- 2 **Soil retention mats** shall consist of a machine-produced mat of wood fibers, wood excelsior, or manmade fiber that shall intertwine or interlock. Matting shall be nontoxic to vegetation and germination of seed and shall not be injurious to the unprotected skin of the human body.
Mats shall be of consistent thickness, with fiber evenly distributed over its entire area, and covered on the top and bottom side with netting having a high web strength or covered on the top side with netting having a high web strength and machine sewn on 2-inch centers along the longitudinal axis of the material. Netting shall be entwined with the mat for maximum strength and ease of handling.
- 3 **Soil stabilization mats** shall be from the Department's approved products list for the site conditional use(s) specified.

- (l) **Fencing and Steel Posts for Protection of Landscape:** When specified on the plans, fencing to delineate areas of landscaping to be protected shall be 40 inches in height, international orange, high-visibility, plastic (polyethylene) web fencing. Fence posts shall be conventional metal "T" or "U" posts 6 feet in length. The plastic fencing shall be securely fastened to the posts in a manner approved by the Engineer. The plastic fencing shall have the following physical qualities:

Tensile Yield = Average 2,000 pounds per 4-foot width (ASTM D 638)

Ultimate Tensile Yield = Average 2,900 pounds per 4-foot width (ASTM D 638)

Elongation at Break (%) = Greater than 1000% (ASTM D 638)

Chemical Resistance = Inert to most chemicals and acids.

Other fencing materials may be specified for use in accordance with the requirements of Section 507 or as noted on the plans and specifications or as approved by the Engineer.