

Tests will be performed in accordance with the following methods:

Characteristics	Test Method	Other
Viscosity	ASTM D2393, Model RVF Brook-field visco-meter	Determination to be made at Class A–32°F Class B–50°F Class C–77°F
Epoxide equivalent	ASTM D1652 and VTM-43	
Volatile content	ASTM D1259, Method B, for mixed system	Sample cured 4 days at room temperature and weighed on previously weighed metal foil
Filler content	VTM-43	
Ash content	ASTM D482	
Pot life	AASHTO T237	Determination to be made at Class A–32°F Class B–50°F Class C–75°F
Tensile strength	ASTM D638	
Bond strength	VTM-41	
Compressive strength	VTM-41	
Water absorption	ASTM D570	
Thermal shear	VTM-42	

## 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.
- Herbicide for control of broad-leaf 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, which shall be applied in accordance with the manufacturer's registered label.

(b) **Topsoil:**

1. **Class A topsoil** shall be stockpiled topsoil that has been salvaged in accordance with the requirements of Section 303.04(a). It shall be free from refuse or any material toxic to plant growth and reasonably free from subsoil, stumps, roots, brush, stones, clay lumps, or similar objects larger than 3 inches in their greatest dimension.
2. **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 by the Soil Science Society of America. It shall consist of natural, friable, loamy soil without admixtures of subsoil or other foreign materials and shall be reasonably free from stumps, roots, hard lumps, stiff clay, stones, noxious weeds, brush, or other litter. It shall have demonstrated by evidence of healthy vegetation growing or having grown on it prior to stripping that it is reasonably well drained and does not contain substances toxic to plants.
3. **Topsoil for planting plants** shall be furnished by the Contractor and shall have a pH in the range of 6.0 to 7.0 prior to mixing with organic matter. If the pH is not within this range, the pH shall be corrected at the Contractor's expense or a different source of supply shall be selected. Topsoil shall be subject to inspection by the Engineer at the source of supply and immediately prior to use in planting and shall be mixed with organic matter as specified.

- (c) **Seeds:** Kinds and varieties of seeds shall be delivered to the project in separate sacks bearing a green seed label denoting the seed has been 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 test shall be completed within the nine-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.

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:**

1. **Fertilizer for seeding and sodding** shall be uniform in composition, free flowing, and suitable for application with approved equipment. Fertilizer shall be delivered to the project in bags or other convenient containers, each fully labeled, and shall conform to the applicable state and federal regulations. Additional nutrients shall be added only when specified.

Ureaformaldehyde shall be slow-release fertilizer material containing 38 percent nitrogen. The material shall have an activity index of 40 to 55 percent as determined by tests in accordance with the Association of Official Agricultural Chemists.

2. **Fertilizer for planting plants** shall have an NPK analysis ratio of 3-1-1, 3-1-2 or 4-1-1 slow release. Approximately 75 percent of the nitrogen shall be slow release nitrogen from methylene ureas, also termed ureaformaldehydes, that become slowly available for plants through nitrogen breakdown by soil microbes. Urea nitrogen shall not be used except as specified hereinafter. The phosphate fraction shall be triple superphosphate. Fertilizers to be mixed shall be delivered to the project or another approved location in separate bags bearing the manufacturer's label and shall be thoroughly mixed in the presence of the Engineer on the job or other approved location in the following amounts: 20 pounds of ureaformaldehyde as specified herein (38 percent N), 5 pounds of urea (45 percent N), 65 pounds of triple superphosphate (46 percent  $P_2O_5$ ), and 10 pounds of muriate of potash (60 percent  $K_2O$ ).

- (e) **Lime:** Lime shall be agricultural grade ground limestone. Agricultural grade pulverized limestone may be used at no additional cost to the Department.

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.

- (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 very 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 approx. 10 mm
Thickness or diameter	Approx. 1 mm
Net dry weight content (VTM-47)	Min. stated on bag
pH range (TAPPI T509 or ASTM D778)	4.0 to 8.5
Ash content (TAPPI T413 or ASTM D586)	Max. 7.0%
Water holding capacity (VTM-46)	Min. 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 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 used in planting plants** shall be pine bark, wood chips, or other material specified on the plans or approved by the Engineer. Mulch shall not be used until it has been inspected and approved by the Engineer.
- (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 *American National Standard for Nursery Stock*, by the American Association of Nurserymen, Inc., and these specifications. Plants shall be first class representatives of their normal species and varieties; shall have well furnished branch systems and vigorous fibrous root systems characteristic of their respective kinds; shall be nursery grown; 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, sunscalds, bark abrasions, or any other form of damage or objectionable disfigurements. Where 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 healing and cuts more than 3/4 inch that have not completely callused over. Deciduous shade trees shall conform to the requirements for street trees as specified in the *American National Standard for Nursery Stock*. 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 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 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 suitable 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 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 1/2 inches for the 1 gallon and 2 gallon sizes and not more than 2 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 not protrude through drainage holes or over the rim of the container to the extent that they will be damaged while the root ball is removed from the container.
  - d. Plants shall have been acclimated to outside conditions. Container grown plants may be used provided their use is approved in writing by the Engineer.

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. **Peat moss** shall be granulated, shredded, or milled sphagnum moss, nearly free from woody materials and consisting of at least 75 percent decomposed leaves and stems of sphagnum moss essentially brown in color. The texture may vary from porous to spongy fibrous. Peat moss shall be free from sticks, stones, mineral matter, or other foreign material. Peat moss shall have a pH of from 3.5 to 5.5.
2. **Tree wrap** shall be waterproof paper, 30-30-30 krinklecraft or its equivalent, in strips 4 inches in width.
3. **Twine** for wrapping trees shall be jute twine, at least two-ply.
4. **Soil mixture used to backfill planting pits** shall consist of 1 part peat moss and 4 parts topsoil as specified herein. Prior to use, peat moss and topsoil shall be thoroughly mixed. The method of mixing and the area in which the mixing operation is performed shall be approved by the Engineer.
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.

(k) **Soil Retention Coverings:**

1. **Jute mesh** shall be a uniform, open, plain weave of undyed and unbleached single 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 two 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 use specified.

## **SECTION 245—GEOSYNTHETICS**

### **245.01—Description.**

These specifications cover artificial fiber textile products to be used in transportation construction work.

### **245.02—Detail Requirements.**

Geotextile fabric shall be protected from mud, dirt, dust, sunlight, and debris during transport and storage. Material shall be inert to commonly encountered chemicals; resistant to mildew, rot, insects, and rodents; and biologically and thermally stable. Geotextile fabric for subsurface installation shall not be exposed to direct sunlight for more than 24 hours during installation.

Tensile strength requirements are in the machine and cross-machine directions.

### **245.03—Testing and Documentation.**

Geosynthetics shall be tested by an independent commercial laboratory, to verify the material requirements specified herein. The Contractor shall provide written documentation of all tests specified. Documentation shall include style, lot, roll numbers, and actual results of each test. In addition, the name, address, phone number of the testing laboratory, and date of testing shall be provided.

- (a) **Geotextile Fabric for Use in Silt Fences, Silt Barriers, or Filter Barriers:** Fabric shall contain ultraviolet inhibitors and stabilizers to provide at