

Section G - VEGETATIVE PRACTICES

20.0 STANDARDS AND SPECIFICATIONS

FOR

VEGETATIVE STABILIZATION

Definition

Using vegetation as cover for barren soil to protect it from forces that cause erosion.

Purpose

Vegetative Stabilization specifications are used to promote the establishment of vegetation on exposed soil. When soil is stabilized with vegetation, the soil is less likely to erode and more likely to allow infiltration of rainfall, thereby reducing sediment loads and runoff to downstream areas, and improving wildlife habitat and visual resources.

Conditions Where Practice Applies

This practice shall be used on denuded areas as specified on the plans and may be used on highly erodible or critically eroding areas. This specification is divided into Temporary Seeding, to quickly establish vegetative cover for short duration (up to one year), and Permanent Seeding, for long term vegetative cover. Examples of applicable areas for Temporary Seeding are temporary soil stockpiles, cleared areas being left idle between construction phases, earth dikes, etc. and for Permanent Seeding are lawns, dams, cut and fill slopes and other areas at final grade, former stockpile and staging areas, etc.

Effects on Water Quality and Quantity

Planting vegetation in disturbed areas will have an effect on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, percolation, and groundwater recharge. Vegetation, over time, will increase organic matter content and improve the water holding capacity of the soil and subsequent plant growth.

Vegetation will help reduce the movement of sediment, nutrients, and other chemicals carried by runoff to receiving waters. Plants will also help protect groundwater supplies by assimilating those substances present within the root zone.

Sediment control devices must remain in place during grading, seedbed preparation, seeding, mulching and vegetative establishment to prevent large quantities of sediment and associated chemicals and nutrients from washing into surface waters.

Section I - Vegetative Stabilization Methods and Materials

A. Site Preparation

- i. Install erosion and sediment control structures (either temporary or permanent) such as diversions, grade stabilization structures, berms, waterways, or sediment control basins.
- ii. Perform all grading operations at right angles to the slope. Final grading and shaping is not usually necessary for temporary seeding.
- iii. Schedule required soil tests to determine soil amendment composition and application rates for sites having disturbed area over 5 acres.

B. Soil Amendments (Fertilizer and Lime Specifications)

- i. Soil tests must be performed to determine the exact ratios and application rates for both lime and fertilizer on sites having disturbed areas over 5 acres. Soil analysis may be performed by the University of Maryland or a recognized commercial laboratory. Soil samples taken for engineering purposes may also be used for chemical analyses.
- ii. Fertilizers shall be uniform in composition, free flowing and suitable for accurate application by approved equipment. Manure may be substituted for fertilizer with prior approval from the appropriate approval authority. Fertilizers shall all be delivered to the site fully labeled according to the applicable state fertilizer laws and shall bear the name, trade name or trademark and warrantee of the producer.
- iii. Lime materials shall be ground limestone (hydrated or burnt lime may be substituted) which contains at least 50% total oxides (calcium oxide plus magnesium oxide). Limestone shall be ground to such fineness that at least 50% will pass through a #100 mesh sieve and 98 - 100% will pass through a #20 mesh sieve.
- iv. Incorporate lime and fertilizer into the top 3 - 5" of soil by disking or other suitable means.

C. Seedbed Preparation

- i. **Temporary Seeding**
 - a. Seedbed preparation shall consist of loosening soil to a depth of 3" to 5" by means of suitable agricultural or construction equipment, such as disc harrows or chisel plows or rippers mounted on construction equipment. After the soil is loosened it should not be rolled or dragged smooth but left in the roughened condition. Sloped areas (greater than 3:1) should be tracked leaving the surface in an irregular condition with ridges running parallel to the contour of the slope.
 - b. Apply fertilizer and lime as prescribed on the plans.
 - c. Incorporate lime and fertilizer into the top 3 - 5" of soil by disking or other suitable means.

ii. Permanent Seeding

a. Minimum soil conditions required for permanent vegetative establishment:

1. Soil pH shall be between 6.0 and 7.0
2. Soluble salts shall be less than 500 parts per million (ppm).
3. The soil shall contain less than 40% clay but enough fine grained material (> 30% silt plus clay) to provide the capacity to hold a moderate amount of moisture. An exception is if lovegrass or seresia lespedeza is to be planted, then a sandy soil (< 30% silt plus clay) would be acceptable.
4. Soil shall contain 1.5% minimum organic matter by weight.
5. Soil must contain sufficient pore space to permit adequate root penetration.
6. If these conditions cannot be met by soils on site, adding topsoil is required in accordance with Section 21 Standard and Specification for Topsoil.

b. Areas previously graded in conformance with the drawings shall be maintained in a true and even grade, then scarified or otherwise loosened to a depth of 3 - 5" to permit bonding of the topsoil to the surface area and to create horizontal erosion check slots to prevent topsoil from sliding down a slope.

c. Apply soil amendments as per soil test or as included on the plans.

d. Mix soil amendments into the top 3 - 5" of topsoil by disking or other suitable means. Lawn areas should be raked to smooth the surface, remove large objects like stones and branches, and ready the area for seed application. Where site conditions will not permit normal seedbed preparation, loosen surface soil by dragging with a heavy chain or other equipment to roughen the surface. Steep slopes (steeper than 3:1) should be tracked by a dozer leaving the soil in an irregular condition with ridges running parallel to the contour of the slope. The top 1 - 3" of soil should be loose and friable. Seedbed loosening may not be necessary on newly disturbed areas.

D. Seed Specifications

- i. All seed must meet the requirements of the Maryland State Seed Law. All seed shall be subject to re-testing by a recognized seed laboratory. All seed used shall have been tested within the 6 months immediately preceding the date of sowing such material on this job.

Note: Seed tags shall be made available to the inspector to verify type and rate of seed used.

- ii. Inoculant - The inoculant for treating legume seed in the seed mixtures shall be a pure culture of nitrogen-fixing bacteria prepared specifically for the species. Inoculants shall not be used later than the date indicated on the container. Add fresh inoculant as directed on package. Use four times the recommended rate when hydroseeding. Note: It is very important to keep inoculant as cool as possible until used. Temperatures above 75-80° F. can weaken bacteria and make the inoculant less effective.

E. Methods of Seeding

- i. **Hydroseeding:** Apply seed uniformly with hydroseeder (slurry includes seed and fertilizer), broadcast or drop seeder, or a cultipacker seeder.
 - a. If fertilizer is being applied at the time of seeding, the application rates amounts will not exceed the following: nitrogen; maximum of 100 lbs. per acre total of soluble nitrogen; P205 (phosphorous): 200 lbs/ac; K20 (potassium): 200 lbs/ac.
 - b. Lime - use only ground agricultural limestone, (Up to 3 tons per acre may be applied by hydroseeding). Normally, not more than 2 tons are applied by hydroseeding at any one time. Do not use burnt or hydrated lime when hydroseeding.
 - c. Seed and fertilizer shall be mixed on site and seeding shall be done immediately and without interruption.
- ii. **Dry Seeding:** This includes use of conventional drop or broadcast spreaders.
 - a. Seed spread dry shall be incorporated into the subsoil at the rates prescribed on the Temporary or Permanent Seeding Summaries or Tables 25 or 26. The seeded area shall then be rolled with a weighted roller to provide good seed to soil contact.
 - b. Where practical, seed should be applied in two directions perpendicular to each other. Apply half the seeding rate in each direction.
- iii. **Drill or Cultipacker Seeding:** Mechanized seeders that apply and cover seed with soil.
 - a. Cultipacking seeders are required to bury the seed in such a fashion as to provide at least 1/4 inch of soil covering. Seedbed must be firm after planting.
 - b. Where practical, seed should be applied in two directions perpendicular to each other. Apply half the seeding rate in each direction.

F. Mulch Specifications (In order of preference)

- i. Straw shall consist of thoroughly threshed wheat, rye or oat straw, reasonably bright in color, and shall not be musty, moldy, caked, decayed, or excessively dusty and shall be free of noxious weed seeds as specified in the Maryland Seed Law.
- ii. **Wood Cellulose Fiber Mulch (WCFM)**
 - a. WCFM shall consist of specially prepared wood cellulose processed into a uniform fibrous physical state.
 - b. WCFM 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.
 - c. WCFM, including dye, shall contain no germination or growth inhibiting factors.

- d. WCFM materials shall be manufactured and processed in such a manner that the wood cellulose fiber mulch will remain in uniform suspension in water under agitation and will blend with seed, fertilizer and other additives to form a homogeneous slurry. The mulch material shall form a blotter-like 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 the grass seedlings.
- e. WCFM material shall contain no elements or compounds at concentration levels that will be phyto-toxic.
- f. WCFM must conform to the following physical requirements: fiber length to approximately 10 mm., diameter approximately 1 mm., pH range of 4.0 to 8.5, ash content of 1.6% maximum and water holding capacity of 90% minimum.

Note: Only sterile straw mulch should be used in areas where one species of grass is desired.

G. Mulching Seeded Areas - Mulch shall be applied to all seeded areas immediately after seeding.

- i. If grading is completed outside of the seeding season, mulch alone shall be applied as prescribed in this section and maintained until the seeding season returns and seeding can be performed in accordance with these specifications.
- ii. When straw mulch is used, it shall be spread over all seeded areas at the rate of 2 tons/acre. Mulch shall be applied to a uniform loose depth of between 1" and 2". Mulch applied shall achieve a uniform distribution and depth so that the soil surface is not exposed. If a mulch anchoring tool is to be used, the rate should be increased to 2.5 tons/acre.
- iii. Wood cellulose fiber used as a mulch shall be applied at a net dry weight of 1,500 lbs. per acre. The wood cellulose fiber shall be mixed with water, and the mixture shall contain a maximum of 50 lbs. of wood cellulose fiber per 100 gallons of water.

H. Securing Straw Mulch (Mulch Anchoring): Mulch anchoring shall be performed immediately following mulch application to minimize loss by wind or water. This may be done by one of the following methods (listed by preference), depending upon size of area and erosion hazard:

- i. A mulch anchoring tool is a tractor drawn implement designed to punch and anchor mulch into the soil surface a minimum of two (2) inches. This practice is most effective on large areas, but is limited to flatter slopes where equipment can operate safely. If used on sloping land, this practice should be used on the contour if possible.
- ii. Wood cellulose fiber may be used for anchoring straw. The fiber binder shall be applied at a net dry weight of 750 pounds/acre. The wood cellulose fiber shall be mixed with water and the mixture shall contain a maximum of 50 pounds of wood cellulose fiber per 100 gallons of water.
- iii. Application of liquid binders should be heavier at the edges where wind catches mulch, such as in valleys and on crests of banks. The remainder of area should be appear uniform after binder application. Synthetic binders - such as Acrylic DLR (Agro-Tack), DCA-70, Petroset, Terra Tax II, Terra Tack AR or other approved equal may be used at rates recommended by the manufacturer to anchor mulch.

- iv. Lightweight plastic netting may be stapled over the mulch according to manufacturer's recommendations. Netting is usually available in rolls 4' to 15' feet wide and 300 to 3,000 feet long.

I. Incremental Stabilization - Cut Slopes

- i. All cut slopes shall be dressed, prepared, seeded and mulched as the work progresses. Slopes shall be excavated and stabilized in equal increments not to exceed 15'.
- ii. Construction sequence (Refer to Figure 3 below):
 - a. Excavate and stabilize all temporary swales, side ditches, or berms that will be used to convey runoff from the excavation.
 - b. Perform phase 1 excavation, dress, and stabilize.
 - c. Perform phase 2 excavation, dress, and stabilize. Overseed phase 1 areas as necessary.
 - d. Perform final phase excavation, dress, and stabilize. Overseed previously seeded areas as necessary.

Note: Once excavation has begun the operation should be continuous from grubbing through the completion of grading and placement of topsoil (if required) and permanent seed and mulch. Any interruptions in the operation or completing the operation out of the seeding season will necessitate the application of temporary stabilization.

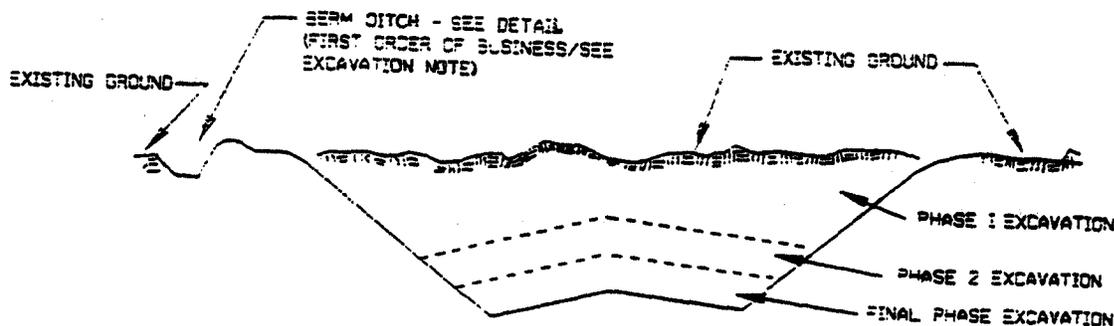


Figure 4 Incremental Stabilization - Cut

J. Incremental Stabilization of Embankments - Fill Slopes

- i. Embankments shall be constructed in lifts as prescribed on the plans.
- ii. Slopes shall be stabilized immediately when the vertical height of the multiple lifts reaches 15', or when the grading operation ceases as prescribed in the plans.
- iii. At the end of each day, temporary berms and pipe slope drains should be constructed along the top edge of the embankment to intercept surface runoff and convey it down the slope in a non-erosive manner to a sediment trapping device.
- iv. Construction sequence: Refer to Figure 4 (below).
 - a. Excavate and stabilize all temporary swales, side ditches, or berms that will be used to divert runoff around the fill. Construct Slope Silt Fence on low side of fill as shown in Figure 5, unless other methods shown on the plans address this area.
 - b. Place phase 1 embankment, dress and stabilize.
 - c. Place phase 2 embankment, dress and stabilize.
 - d. Place final phase embankment, dress and stabilize. Overseed previously seeded areas as necessary.

Note: Once the placement of fill has begun the operation should be continuous from grubbing through the completion of grading and placement of topsoil (if required) and permanent seed and mulch. Any interruptions in the operation or completing the operation out of the seeding season will necessitate the application of temporary stabilization.

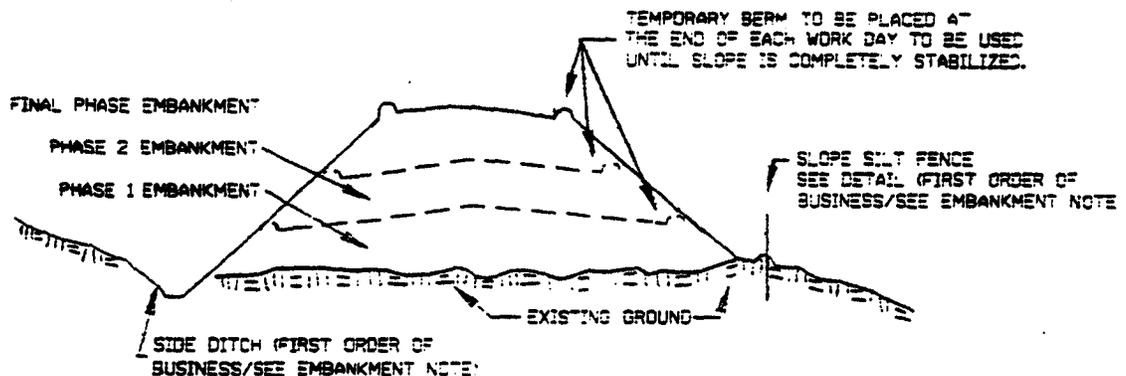


Figure 5 Incremental Stabilization - Fill

Section II - Temporary Seeding

Vegetation - annual grass or grain used to provide cover on disturbed areas for up to 12 months. For longer duration of vegetative cover, Permanent Seeding is required.

A. Seed Mixtures - Temporary Seeding

- i. Select one or more of the species or mixtures listed in Table 26 for the appropriate Plant Hardiness Zone (from Figure 5) and enter them in the Temporary Seeding Summary below, along with application rates, seeding dates and seeding depths. If this Summary is not put on the plans and completed, then Table 26 must be put on the plans.
- ii. For sites having soil tests performed, the rates shown on this table shall be deleted and the rates recommended by the testing agency shall be written in. Soil tests are not required for Temporary Seeding.

Temporary Seeding Summary

Seed Mixture (Hardiness Zone _____) From Table 26					Fertilizer Rate (10-10-10)	Lime Rate
No.	Species	Application Rate (lb/ac)	Seeding Dates	Seeding Depths		
					600 lb/ac (15 lb/1000 sf)	2 tons/ac (100 lb/1000 sf)

Section III: Permanent Seeding

Seeding grass and legumes to establish ground cover for a minimum period of one year on disturbed areas generally receiving low maintenance.

A. Seed Mixtures - Permanent Seeding

- i. Select one or more of the species or mixtures listed in Table 25 for the appropriate Plant Hardiness Zone (from Figure 5) and enter them in the Permanent Seeding Summary below, along with application rates and seeding dates. Seeding depths can be estimated using Table 26. If this Summary is not put on the construction plans and completed, then Table 25 must be put on the plans. Additional planting specifications for exceptional sites such as shorelines, streambanks, or dunes or for special purposes such as wildlife or aesthetic treatment may be found in USDA-SCS Technical Field Office Guide, Section 342 - Critical Area Planting. For special lawn maintenance areas, see Sections IV Sod and V Turfgrass.
- ii. For sites having disturbed area over 5 acres, the rates shown on this table shall be deleted and the rates recommended by the soil testing agency shall be written in.
- iii. For areas receiving low maintenance, apply ureaform fertilizer (46-0-0) at 3 1/2 lbs/1000 sq.ft. (150 lbs/ac), in addition to the above soil amendments shown in the table below, to be performed at the time of seeding.

Permanent Seeding Summary

Seed Mixture (For Hardiness Zone _____) (From Table 25)					Fertilizer Rate (10-20-20)			Lime Rate
No.	Species	Application Rate (lb/ac)	Seeding Dates	Seeding Depths	N	P205	K20	
					90 lb/ac (2.0 lb/ 1000 sf)	175 lb/ac (4 lb/ 1000 sf)	175 lb/ac (4 lb/ 1000 sf)	2 tons/ac (100 lb/ 1000 sf)

Section IV - Sod: To provide quick cover on disturbed areas (2:1 grade or flatter).

A. General specifications

- i. Class of turfgrass sod shall be Maryland or Virginia State Certified or Approved. Sod labels shall be made available to the job foreman and inspector.
- ii. Sod shall be machine cut at a uniform soil thickness of 3/4", plus or minus 1/4", at the time of cutting. Measurement for thickness shall exclude top growth and thatch. Individual pieces of sod shall be cut to the suppliers width and length. Maximum allowable deviation from standard widths and lengths shall be 5 percent. Broken pads and torn or uneven ends will not be acceptable.
- iii. Standard size sections of sod shall be strong enough to support their own weight and retain their size and shape when suspended vertically with a firm grasp on the upper 10 percent of the section.
- iv. Sod shall not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.
- v. Sod shall be harvested, delivered, and installed within a period of 36 hours. Sod not transplanted within this period shall be approved by an agronomist or soil scientist prior to its installation.

B. Sod Installation

- i. During periods of excessively high temperature or in areas having dry subsoil, the subsoil shall be lightly irrigated immediately prior to laying the sod.
- ii. The first row of sod shall be laid in a straight line with subsequent rows placed parallel to and tightly wedged against each other. Lateral joints shall be staggered to promote more uniform growth and strength. Ensure that sod is not stretched or overlapped and that all joints are butted tight in order to prevent voids which would cause air drying of the roots.
- iii. Wherever possible, sod shall be laid with the long edges parallel to the contour and with staggering joints. Sod shall be rolled and tamped, pegged or otherwise secured to prevent slippage on slopes and to ensure solid contact between sod roots and the underlying soil surface.
- iv. Sod shall be watered immediately following rolling or tamping until the underside of the new sod pad and soil surface below the sod are thoroughly wet. The operations of laying, tamping and irrigating for any piece of sod shall be completed within eight hours.

C. Sod Maintenance

- i. In the absence of adequate rainfall, watering shall be performed daily or as often as necessary during the first week and in sufficient quantities to maintain moist soil to a depth of 4". Watering should be done during the heat of the day to prevent wilting.
- ii. After the first week, sod watering is required as necessary to maintain adequate moisture content.
- iii. The first mowing of sod should not be attempted until the sod is firmly rooted. No more than 1/3 of the grass leaf shall be removed by the initial cutting or subsequent cuttings. Grass height shall be maintained between 2" and 3" unless otherwise specified.

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Section IV - Turfgrass Establishment

Areas where turfgrass may be desired include lawns, parks, playgrounds, and commercial sites which will receive a medium to high level of maintenance. Areas to receive seed shall be tilled by disking or other approved methods to a depth of 2 to 4 inches, leveled and raked to prepare a proper seedbed. Stones and debris over 1 1/2 inches in diameter shall be removed. The resulting seedbed shall be in such condition that future mowing of grasses will pose no difficulty.

Note: Choose certified material. Certified material is the best guarantee of cultivar purity. The certification program of the Maryland Department of Agriculture, Turf and Seed Section, provides a reliable means of consumer protection and assures a pure genetic line.

A. Turfgrass Mixtures

- i. Kentucky Bluegrass - Full sun mixture - For use in areas that receive intensive management. Irrigation required in the areas of central Maryland and eastern shore. Recommended Certified Kentucky Bluegrass Cultivars Seeding Rate: 1.5 to 2.0 pounds/1000 square feet. A minimum of three bluegrass cultivars should be chosen ranging from a minimum of 10% to a maximum of 35% of the mixture by weight.
- ii. Kentucky Bluegrass/Perennial Rye - Full sun mixture - For use in full sun areas where rapid establishment is necessary and when turf will receive medium to intensive management. Certified Perennial Ryegrass Cultivars/Certified Kentucky Bluegrass Seeding rate: 2 pounds mixture/1000 square feet. A minimum of 3 Kentucky Bluegrass Cultivars must be chosen, with each cultivar ranging from 10% to 35% of the mixture by weight.
- iii. Tall Fescue/Kentucky Bluegrass - Full sun mixture - For use in drought prone areas and/or for areas receiving low to medium management in full sun to medium shade. Recommended mixture includes; certified Tall Fescue Cultivars 95 - 100% , certified Kentucky Bluegrass Cultivars 0 - 5%. Seeding rate: 5 to 8 lb/1000 sf. One or more cultivars may be blended.
- iv. Kentucky Bluegrass/Fine Fescue - Shade Mixture - For use in areas with shade in Bluegrass lawns. For establishment in high quality, intensively managed turf area. Mixture includes; certified Kentucky Bluegrass Cultivars 30-40% and certified Fine Fescue and 60-70%. Seeding rate: 1 1/2 - 3 lbs/1000 square feet. A minimum of 3 Kentucky bluegrass cultivars must be chosen, with each cultivar ranging from a minimum of 10% to a maximum of 35% of the mixture by weight.

Note: Turfgrass varieties should be selected from those listed in the most current University of Maryland Publication, Agronomy Mimeo #77, "Turfgrass Cultivar Recommendations for Maryland".

B. Ideal times of seeding

Western MD: March 15 - June 1, August 1 - October 1 (Hardiness Zones - 5b, 6a)

Central MD: March 1 - May 15, August 15 - October 15 (Hardiness Zone - 6b)

Southern MD, Eastern Shore: March 1 - May 15, August 15 - October 15 (Hardiness Zones - 7a, 7b)

C. Irrigation

If soil moisture is deficient, supply new seedings with adequate water for plant growth (1/2" - 1" every 3 to 4 days depending on soil texture) until they are firmly established. This is especially true when seedings are made late in the planting season, in abnormally dry or hot seasons, or on adverse sites.

D. Repairs and Maintenance

Inspect all seeded areas for failures and make necessary repairs, replacements, and reseedings within the planting season.

- i. Once the vegetation is established, the site shall have 95% groundcover to be considered adequately stabilized.
- ii. If the stand provides less than 40% ground coverage, reestablish following original lime, fertilizer, seedbed preparation and seeding recommendations.
- iii. If the stand provides between 40% and 94% ground coverage, overseeding and fertilizing using half of the rates originally applied may be necessary.
- iv. Maintenance fertilizer rates for permanent seedings are shown in Table 24. For lawns and other medium to high maintenance turfgrass areas, refer to the University of Maryland publication "Lawn Care in Maryland" Bulletin No. 171.

Table 21 Recommended Varieties of Grasses and Legumes for Disturbed Areas

Areas Receiving Low Maintenance^{1/}

<u>Grasses</u>	<u>Varieties</u>
Tall Fescue	Adventure, Apache, Arid, Bonanza, Falcon, Clemfine, Finelawn I, Hounddog, Jaguar, Kentucky 31 ^{2/} , Mustang, Olympic, Rebel II, Tribute
Perennial Ryegrass	All-Star, Blazer, Manhattan, Palmer, Pennant, Pennfine, Premier, Prelude, Regal, Repell
Kentucky Bluegrass	"Common", Kenblue, Victa, Ram I, Monopoly
Creeping Red Fescue	Pennlawn, Flyer
Hard Fescue	Aurora, Biljart, Reliant, Scaldis, Spartan, Waldina
Chewings Fescue	Longfellow, Victory, Jamestown
Canada Bluegrass	Reubens
Redtop	Streaker
Poa Trivialis	Laser, Sabre
Reed Canarygrass	Ioreed, Palaton, Rise
Weeping Lovegrass	Morpa, "Common"
Legumes	Variety
Crownvetch	Penngift, Chemung
Serecia Lespedeza	Interstate, Interstate 76, Appalow
Flatpea	Lathco
Birdsfoot Trefoil	Empire, Norcen, Viking

1/ Refer to latest Agronomy Memo #77, University of Maryland - Cooperative Extension Service, for the Turfgrass Cultivars recommended for Maryland. This publication is updated annually.

2/ Kentucky 31 Tall Fescue shall not be used to stabilize wetlands or wetland buffer areas. Contact Maryland Department of Natural Resources, Nontidal Wetlands Division for more information.

Table 22 Quality of Seed

	<u>Minimum</u> <u>Seed Purity (%)</u>	<u>Minimum</u> <u>Germination (%)</u>
<u>LEGUMES</u>		
Birdsfoot Trefoil	97	85
Crownvetch	98.5	80
Lespedeza, Sericea	98	85
Flatpea	98	80
<u>GRASSES</u>		
Bluegrass, Canada	90	80
Bluegrass, Kentucky	90	80
Fescue, red	98.5	85
Fescue, Chewings	98	85
Fescue, tall	98	90
Lovegrass, weeping	98	80
Redtop	92	80
Reed canarygrass	96	80
Ryegrass, Annual	95	85
Ryegrass, Perennial	98	90
<u>OTHER ANNUALS</u>		
Barley	98	90
Millet	99	80
Oats	99	90
Rye	98.5	85

NOTE: Seed containing prohibited or restricted noxious weeds is unacceptable.

Prohibited Noxious Weeds - Johnsongrass or Johnsongrass crosses, Canada thistle, and quackgrass.

Restricted Noxious Weeds - Wild garlic and wild onion, bermudagrass, annual bluegrass, corn cockle, dodder and bindweed.

Seed should contain less than 2.5% of weed seeds, however, 0% is desirable.

To calculate percent pure live seed, multiply germination times purity and divide by 100.

Example: Tall fescue with a germination of 85 percent and a purity of 97 percent. $97 \times 85 = 8245$. $8245/100 = 82.45$ percent pure live seed.

Table 23 Grass and Legume Plant Characteristics

Common Name	Redtop	Rye	Ryegrass Italian	Sweetclover	Sodagrass	Crowvetch	Lespedeza Korean	Lespedeza Sericea	Ryegrass Perennial	Birdfoot Trefoil
Botanical Name	Arctostis Alba	Secale Cereale	Lolium Multiflorum	Lolium Perenne	Melilotus Alba Officialis	Sorghum Sudanense	Coronilla Varia	Lespedeza Etipulacea	Lolium Perenne	Lotus Corniculatis
Germination Time ^{29/} (Days)	5 - 10	4 - 7	5 - 14	10	4 - 10	14 - 21	5 - 14	7 - 28	5 - 14	10
Growth Habitat ^{30/}	P, SL, B	A	A	B, I	A	P, L, R	A	P, L, B	P, S, B	P, L
Seasons	Cool	X	X	X	X		X		X	X
	Warm				X	X	X	X		X
Drainage Class	Dry, Not Droughty	X	X		X	X	X	X		X
	Well Drained	X	X	X	X	X	X	X	X	X
	Moderately Well Drained	X	X	X	X	X	X	X	X	X
	Somewhat Poorly Drained	X		X		X		X	X	X
	Poorly Drained	X								
Annual Cover	Winter		X	X	X				X	X
	Summer				X	X	X			
pH Range	4.0 - 7.5	5.5 - 7.5	5.5 - 7.5	6.5 - 7.5	4.5 - 7.5	5.5 - 7.5	5.5 - 7.5	5.5 - 7.5	5.5 - 7.5	5.0 - 7.5
Flooding Tolerance	X		X						X	X
Erodable Areas	X	X	X	X	X	X	X	X	X	X
Waterways and Channels	X									
Shade Tolerance			X			X			X	
Foot Traffic	X									
Playgrounds, Athletic Fields, Lawns	X									
Beautify						X				X
Levels of Maintenance	High			X						
	Medium	X	X	X	X			X	X	X
	Low					X	X	X	X	X

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²⁹ Number of days required for majority of seeds to germinate and emerge under favorable conditions

³⁰ Growth Habitat: A-Annual, B-Bunch, BI-Biannual, L-Long Lived, R-Rizomatous or spreads by root stocks, SL-Short Lived, S-Stoloniferous

Table 24 Maintenance Fertilization for Permanent Seedings

Use Soil Test Results or Rates Shown Below

Seeding Mixture	Type	lb/ac	lb/1000 sf	Time	Mowing
Tall fescue makes up 70% or more of cover	10-10-10	500	11.5	Yearly or as needed. Fall	Not closer than 3" if occasional mowing is desired
	or 30-10-10	400	9.2		
Crownvetch Sericea Lespedeza Birdsfoot Trefoil	0-20-0	400	9.2	Spring, the year following establishment and every 4-5 years thereafter	Do not mow crownvetch
Fairly uniform stand of tall fescue and sericea lespedeza, or birdsfoot trefoil	5-10-10	500	11.5	Fall the year following establishment and every 4-5 years thereafter	Not required, no closer than 4" in the fall after seed has matured.
Weeping lovegrass & sericea lespedeza fairly uniform plant distribution.	5-10-10	500	11.5	Spring, the year following establishment and every 3-4 years thereafter.	Not required, not closer than 4" in fall after seed has matured.
Red & chewings fescue, Kentucky bluegrass, hard fescue mixtures	20-10-10	250	5.8	September, 30 days later. December, May 20, June 30, if needed.	Mow no closer than 2" for red fescue and K. bluegrass, 3" for fescue.
		100	2.3		

FIGURE 5

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MARYLAND USDA PLANT HARDINESS ZONES

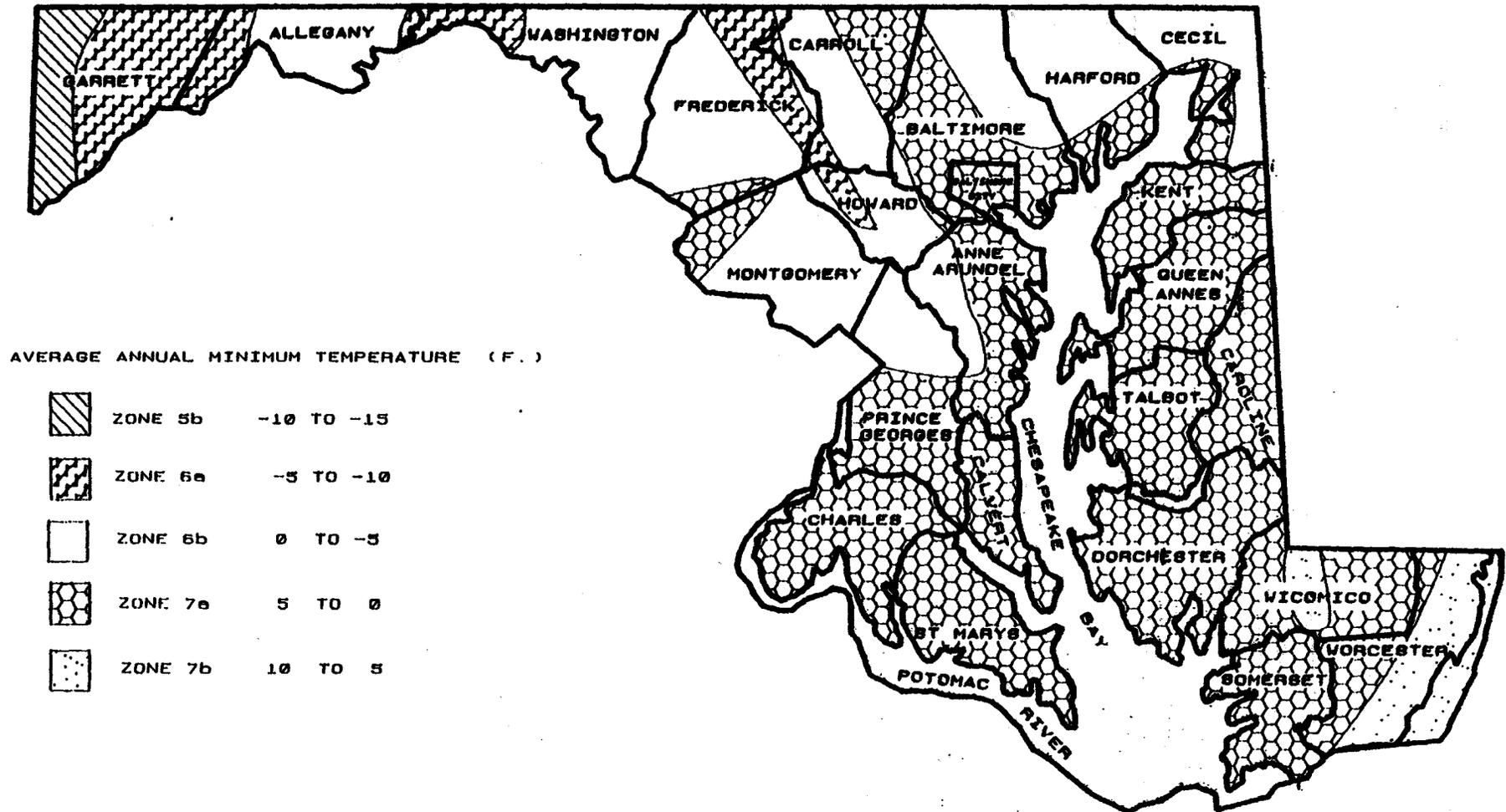


Table 25 Permanent Seeding for Low Maintenance Areas

MIX	SEED MIX (USE CERTIFIED ¹ MATERIAL IF AVAILABLE)	PLANTING		SITE CONDITIONS	USDA HARDI- NESS ZONES ²	RECOMMENDED PLANTING DATES ³							
		LBS/AC	LBS/1000 SQ FT			3/1- 5/15	3/15- 6/1	5/16- 8/14	6/2- 7/31	8/1- 10/1	8/15- 10/15	8/15- 11/15	
1	TALL FESCUE (75%), CANADA BLUEGRASS (10%), KENTUCKY BLUEGRASS (10%), REDTOP (5%) ⁴	150	3.4	MOIST TO DRY	5b		X			X			A
					6a		X			X			
					6b	X					X		
					7a	X						X	
					7b	X						X	
2	KENTUCKY BLUEGRASS (50%), CREEPING RED FESCUE OR A HARD FESCUE (40%), REDTOP (10%)	150	3.4	MOIST TO MODERATELY DRY TO DRY	5b		X			X		B	
					6a		X			X			
					6b	X					X		
3	TALL FESCUE (85%), PERENNIAL RYEGRASS (10%), KENTUCKY BLUEGRASS (5%)	125	2.9	MOIST TO DRY	5B		X			X		C	
		15	.34		6A		X			X			
		10	.23		6B	X					X		
					7A	X							X
					7B	X							X
4	RED FESCUE OR CHEWINGS FESCUE (80%) PERENNIAL RYEGRASS (20%)	60	.92	MOIST TO DRY	5b		X			X		D	
		60	.92		6a		X			X			
		15	.34		6b	X					X		
5	TALL FESCUE (85%) OR, PERENNIAL RYEGRASS (50%) PLUS CROWN VETCH OR FLATPEA	110	2.5	MOIST TO DRY	5b		X			X		E	
		20	.46		6a		X			X			
		20	.46		6b	X					X		
		20	.46		7a	X							X
					7b	X							X
6	WEeping LOVEGRASS (17%) SERECIA LESPEDEZA (83%)	4	.09	DRY TO VERY DRY	6a	X		X				F	
		20	.46		7a	X		X					
					7b	X		X					

NOTES: A/ USED BY SHA ON SLOPED AREAS. ADD A LEGUME FOR SLOPES > THAN 3:1.
 B/ USED IN MEDIAN AREAS BY SHA. SHADE TOLERANT.
 C/ POPULAR MIX - PRODUCES PERMANENT GROUND COVER QUICKLY. BLUEGRASS THICKENS STAND.
 D/ BEST USE ON SHADY SLOPES NOT ON POORLY DRAINED CLAYS.
 E/ USE ON LOW MAINTENANCE, STEEP SLOPES. USE TALL FESCUE IN DRAUGHTY COND. CROWN VETCH BEST FOR 5b, 6a, 6b
 F/ SUITABLE FOR SEEDING IN MID-SUMMER.

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¹ See Table 20 for a list of recommended varieties best suited for Maryland.

² Refer to Figure 5.

³ Recommended planting dates are indicated by an X. For seeding during time periods not recommended use a nurse crop such as weeping love grass or millet (mid-summer), or cereal rye (fall to early spring) refer to Table 26 Temporary Seeding

⁴ Maryland State Highway Administration Approved Mixes.

Table 25 Permanent Seeding for Low Maintenance Areas (Cont'd)

MIX	SEED MIX (USE CERTIFIED MATERIAL IF AVAILABLE)	PLANTING RATE		SITE CONDITIONS	USDA HARDI- NESS ZONES	RECOMMENDED PLANTING DATES						N O T E S		
		LBS/AC	LBS/1000 SQ FT			3/1-5/15	3/15-6/1	5/16-8/14	6/2-7/31	8/1-10/1	8/15-10/15		8/15-11/15	
7	TALL FESCUE (83%) WEEPING LOVEGRASS (2%) PLUS SERECIA LESPEDEZA (15%)	110	2.5	DRY TO VERY DRY	5b		X		X	X			G	
		3	.07		6a		X		X	x				
		20	.46		6b	X		X				X		
					7a	X		X						X
					7b	X		X						X
8	REED CANARYGRASS (75%) REDTOP (6%) PLUS BIRDSFOOT TREEFOIL* (19%)	40	.92	WET TO MODERATELY DRY	5b		X			X			H	
		3	.07		6a		X			X				
		10	.23		6b	X						X		
					7a	X								X
					7b	X								x
9	TALL FESCUE (86%) POA TRIVIALIS (7%) BIRDSFOOT TREEFOIL (7%)	125	2.9	WET TO MODERATELY DRY	5b		X			X			I	
		10	.23		6a		X			X				
		10	.23		6b	X						X		
10	TALL FESCUE (80%) HARD FESCUE (20%)	120	3.4	WET TO DRY	5b		X			X			J	
		30	.69		6a		X			X				
					6b	X						X		
					7a	X								X
					7b	X								X
11	HARD FESCUE (100%)	75	1.7	MOIST TO DRY	5b		X			X			K	
					6a		X			X				
					6b	X						X		
					7a	X								X

NOTES: G/ WEEPING LOVEGRASS MAY BE SEEDED WITH TALL FESCUE IN MID-SUMMER. SERECIA LESPEDEZA IS BEST SUITED FOR ZONES 7a AND 7b.
H/ USE ON POORLY DRAINED SOILS - DITCHES OR WATERWAYS. BIRDSFOOT TREEFOILS BEST FOR ZONES 5b, 6a, ABOVE 2,000 FT.
I/ USE IN AREAS OF MOIST SHADE. POA TRIVIALIS THRIVES IN WET SHADY AREAS.
J/ TALL FESCUE MAY BE SEEDED ALONE. THE HARD FESCUE PROVIDES BETTER SHADE TOLERANCE AND PRODUCES A BETTER STAND.
K/ LOW FERTILITY GRASS. REQUIRES INFREQUENT MOWING, GOOD COMPANION FOR WILDFLOWERS.

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* LEGUMINOUS SEEDS SHALL BE INOCULATED OR TREATED WITH UNEXPIRED APPROVED CULTURE FOR THE SPECIFIC LEGUME, IN THE PROPER PROPORTIONS, AS SPECIFIED ON THE PACKAGE LABEL. THE INOCULANT SHALL BE STORED AT ROOM TEMPERATURE, OUT OF DIRECT SUNLIGHT AND AWAY FROM HEATING UNITS. WHEN SEEDING DRY WITH MECHANICAL SEEDERS THOROUGHLY MIX THE POWDER FORM OF THE INOCULANT WITH THE SEED BY WETTING THE SEED WITH A SMALL AMOUNT OF WATER AND THEN ADDING THE POWDER. THE INOCULATED SEED IS THEN MIXED WITH OTHER SEEDS AND PLANTED WITHIN 48 HOURS. SEEDS INOCULATED WITH LIQUID CULTURES SHALL BE PLANTED WITHIN 24 HOURS. INOCULATED SEED NOT PLANTED WITHIN THE SPECIFIED TIME WILL BE REINOCULATED. WHEN USING HYDRAULIC SEEDERS, USE 10 TIMES THE AMOUNT OF INOCULANT SPECIFIED FOR DRY SEEDING. INOCULATED SEED SHALL NOT BE EXPOSED TO SUNLIGHT OR LEFT IN A SLURRY FOR MORE THAN ONE HOUR. REVERSE REINOCULATION WILL BE NECESSARY.

Table 26 Temporary Seeding Rates, Depths, and Dates

SPECIES	MINIMUM SEEDING RATES		PLANTING DEPT ⁴	HARDINESS ZONES ⁷ AND SEEDING DATES ⁸								
				7a and 7b			6b			6a and 5b		
	PER ACRE	LBS/1000 SQ.FT.	INCHES	2/1-4/30	5/1-8/14	8/15-11/30	3/1-4/30	5/1-8/14	8/15-11/15	3/15-5/31	6/1-7/31	8/1-10/31
CHOOSE ONE:						BY			BY			BY
BARLEY	2.5 BU. (122 lbs)	2.80	1-2	X	-	10/15	X	-	10/15	X	-	10/1
OATS	3 BU. (96 lbs)	2.21	1-2	X	-	-	X	-	-	X	-	-
RYE ⁹	2.5 BU. (140 lbs)	3.22	1-2	X	-	X	X	-	X	X	-	X
BARLEY OR RYE PLUS FOXTAIL MILLET ⁴⁰	150 lbs	3.45	1	X X	X X	10/15 X	X X	X X	10/15 X	X X	X X	10/1 X
WEEPING LOVEGRASS ⁴¹	4 lbs	.09	1/4 - 1/2	-	X	-	-	X	-	-	X	-
ANNUAL RYEGRASS	50 lbs	1.15	1/4 - 1/2	X	-	11/1	X	-	11/1	X	-	8/15
MILLET ⁴²	50 lbs	1.15	1/2	-	X	-	-	X	-	-	X	-

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³⁶ Applicable on slopes of 3:1 or flatter

³⁷ Refer to Figure A - Adopted from USDA, ARS Miscellaneous Publication #1475, January 1990

³⁸ Between fall and spring seeding dates, use mulch only if ground is frozen and reseed when thawed

³⁹ May be used as a nurse crop for late fall/early winter permanent seedings, add 56 lbs/ac to the permanent seeding mixture

⁴⁰ Maryland State Highway Administration Temporary Seed Mix

⁴¹ May be used as a nurse crop for mid-summer permanent seedings. Add 2 lbs/ac to permanent seed mix.

⁴² May be used as a nurse crop for mid-summer permanent seedings. Add 10 lbs/ac to the permanent seeding mix.

Bibliography

1. United States Department of Agriculture, Soil Conservation Service (SCS). USDA-SCS Field Office Technical Guide (Section 342) Critical Area Planting, Soil Conservation Service.
2. Maryland Department of Transportation, State Highway Administration. Standard Specifications for Construction and Materials. State Highway Administration, January, 1982.
3. Maryland Seeding Association, Guidelines and Specifications for Soil Preparation/Seeding and Sodding. Maryland Seeding Association, 1988.
4. The Pennsylvania State University, Extension Service. Agronomy Guide, 1990. The Pennsylvania State University, Extension Service, University Park, Pennsylvania. 1990
5. University of Maryland, Agronomy Department. Turfgrass Cultivars, Recommendations for Maryland, Agronomy Memo No. 77, University of Maryland, Agronomy Department, May 1990.
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21.0 STANDARD AND SPECIFICATIONS

FOR

TOPSOIL

Definition

Placement of topsoil over a prepared subsoil prior to establishment of permanent vegetation.

Purpose

To provide a suitable soil medium for vegetative growth. Soils of concern have low moisture content, low nutrient levels, low pH, materials toxic to plants, and/or unacceptable soil gradation.

Conditions Where Practice Applies

- I. This practice is limited to areas having 2:1 or flatter slopes where:
 - a. The texture of the exposed subsoil/parent material is not adequate to produce vegetative growth.
 - b. The soil material is so shallow that the rooting zone is not deep enough to support plants or furnish continuing supplies of moisture and plant nutrients.
 - c. The original soil to be vegetated contains material toxic to plant growth.
 - d. The soil is so acidic that treatment with limestone is not feasible.
- II. For the purpose of these Standards and Specifications, areas having slopes steeper than 2:1 require special consideration and design for adequate stabilization. Areas having slopes steeper than 2:1 shall have the appropriate stabilization shown on the plans.

Construction and Material Specifications

- I. Topsoil salvaged from the existing site may be used provided that it meets the standards as set forth in these specifications. Typically, the depth of topsoil to be salvaged for a given soil type can be found in the representative soil profile section in the Soil Survey published by USDA-SCS in cooperation with Maryland Agricultural Experimental Station.
- II. Topsoil Specifications - Soil to be used as topsoil must meet the following:
 - i. Topsoil shall be a loam, sandy loam, clay loam, silt loam, sandy clay loam, loamy sand. Other soils may be used if recommended by an agronomist or soil scientist and approved by the appropriate approval authority. Regardless, topsoil shall not be a mixture of contrasting textured subsoils and shall contain less than 5% by volume of cinders, stones, slag, coarse fragments, gravel, sticks, roots, trash, or other materials larger than 1½" in diameter.
 - ii. Topsoil must be free of plants or plant parts such as bermuda grass, quackgrass, Johnsongrass, nutsedge, poison ivy, thistle, or others as specified.

iii. Where the subsoil is either highly acidic or composed of heavy clays, ground limestone shall be spread at the rate of 4-8 tons/acre (200-400 pounds per 1,000 square feet) prior to the placement of topsoil. Lime shall be distributed uniformly over designated areas and worked into the soil in conjunction with tillage operations as described in the following procedures.

II. For sites having disturbed areas under 5 acres:

i. Place topsoil (if required) and apply soil amendments as specified in 20.0 Vegetative Stabilization - Section I - Vegetative Stabilization Methods and Materials.

III. For sites having disturbed areas over 5 acres:

i. On soil meeting Topsoil specifications, obtain test results dictating fertilizer and lime amendments required to bring the soil into compliance with the following:

- a. pH for topsoil shall be between 6.0 and 7.5. If the tested soil demonstrates a pH of less than 6.0, sufficient lime shall be prescribed to raise the pH to 6.5 or higher.
- b. Organic content of topsoil shall be not less than 1.5 percent by weight.
- c. Topsoil having soluble salt content greater than 500 parts per million shall not be used.
- d. No sod or seed shall be placed on soil which has been treated with soil sterilants or chemicals used for weed control until sufficient time has elapsed (14 days min.) to permit dissipation of phyto-toxic materials.

Note: Topsoil substitutes or amendments, as recommended by a qualified agronomist or soil scientist and approved by the appropriate approval authority, may be used in lieu of natural topsoil.

ii. Place topsoil (if required) and apply soil amendments as specified in 20.0 Vegetative Stabilization - Section I - Vegetative Stabilization Methods and Materials.

V. Topsoil Application

i. When topsoiling, maintain needed erosion and sediment control practices such as diversions, Grade Stabilization Structures, Earth Dikes, Slope Silt Fence and Sediment Traps and Basins.

ii. Grades on the areas to be topsoiled, which have been previously established, shall be maintained, albeit 4" - 8" higher in elevation.

iii. Topsoil shall be uniformly distributed in a 4" - 8" layer and lightly compacted to a minimum thickness of 4". Spreading shall be performed in such a manner that sodding or seeding can proceed with a minimum of additional soil preparation and tillage. Any irregularities in the surface resulting from topsoiling or other operations shall be corrected in order to prevent the formation of depressions or water pockets.

iv. Topsoil shall not be placed while the topsoil or subsoil is in a frozen or muddy condition, when the subsoil is excessively wet or in a condition that may otherwise be detrimental to proper grading and seedbed preparation.

VI. Alternative for Permanent Seeding - Instead of applying the full amounts of lime and commercial fertilizer, composted sludge and amendments may be applied as specified below:

- i. Composted Sludge Material for use as a soil conditioner for sites having disturbed areas over 5 acres shall be tested to prescribe amendments and for sites having disturbed areas under 5 acres shall conform to the following requirements:
 - a. Composted sludge shall be supplied by, or originate from, a person or persons that are permitted (at the time of acquisition of the compost) by the Maryland Department of the Environment under COMAR 26.04.06.
 - b. Composted sludge shall contain at least 1 percent nitrogen, 1.5 percent phosphorus, and 0.2 percent potassium and have a Ph of 7.0 to 8.0. If compost does not meet these requirements, the appropriate constituents must be added to meet the requirements prior to use.
 - c. Composted sludge shall be applied at a rate of 1 ton/1,000 square feet.
- iv. Composted sludge shall be amended with a potassium fertilizer applied at the rate of 4 lb/1,000 square feet, and 1/3 the normal lime application rate.

References: Guideline Specifications, Soil Preparation and Sodding. MD-VA, Pub. #1, Cooperative Extension Service, University of Maryland and Virginia Polytechnic Institutes. Revised 1973.

22.0 STANDARD AND SPECIFICATIONS

FOR

EROSION CONTROL MATTING

Definition

Erosion control matting is used to temporarily stabilize channels or steep slopes until vegetation is established. There are many types of matting available. The erosion control matting that is used must withstand velocities of 6 feet per second.

Conditions Where Practice Applies

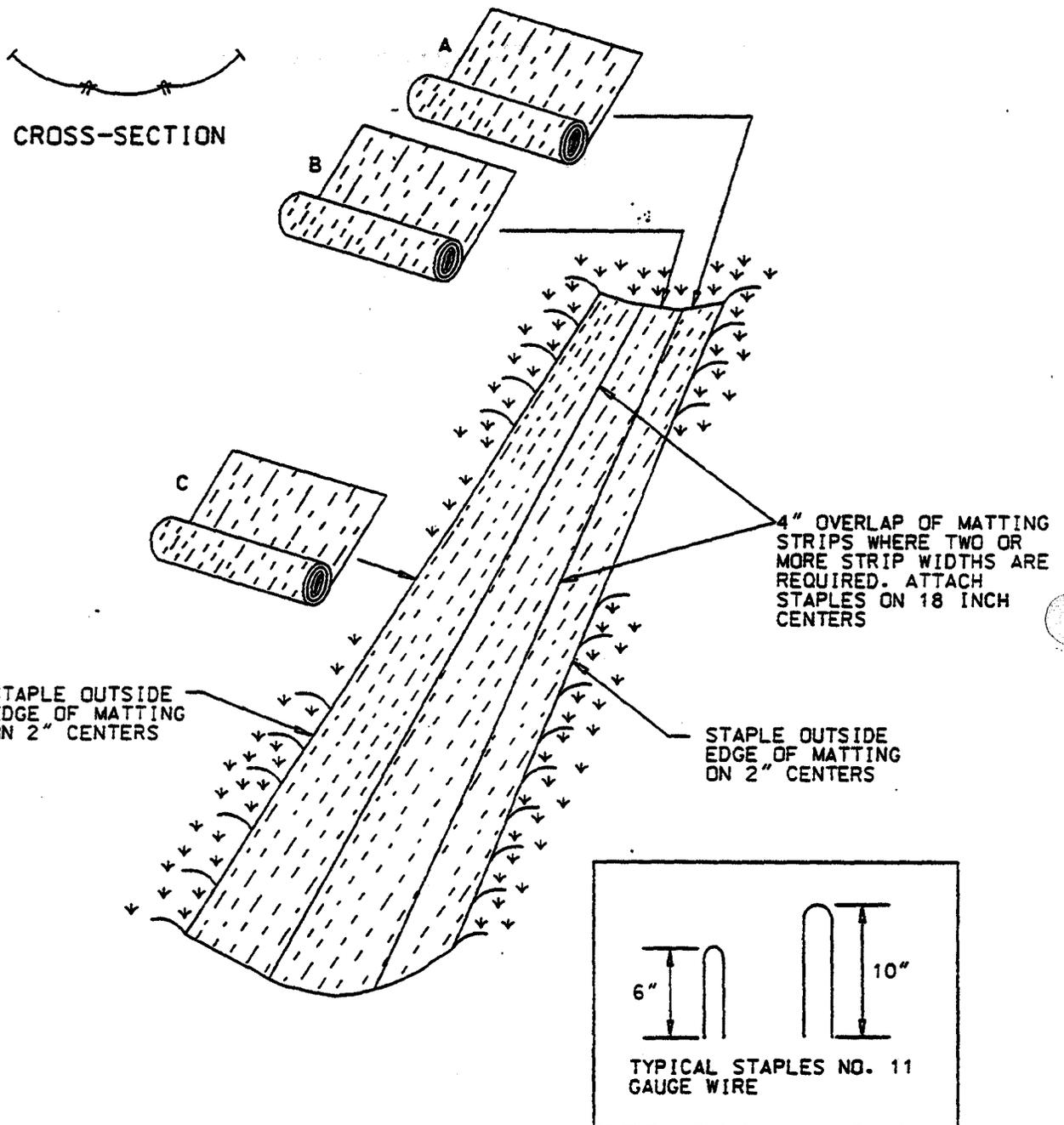
Matting is used to stabilize the flow channels of dikes and swales where the velocity is under 6 feet per second. They may also be used on tidal or stream banks where moving water is likely to wash out new vegetative plantings.

Installation

Some channels will require multiple widths of matting, with two widths being the most commonly used. Unroll the matting starting at the upper end of the channel, allowing a 4" overlap of matting along center of channel. The sequence of construction should be as follows:

1. Bury the top ends of the matting in a narrow trench, 6" in depth. Backfill the trench and tamp firmly to conform to the channel cross-section. Secure with a row of staples about 4" down slope from the trench. Spacing between staples is 6".
2. Staple the 4" overlap in the channel center spacing the staples 18" apart.
3. Make sure the matting is smooth and in firm contact with the soil, then staple the outer edges of the matting. Staples shall be placed 2' apart with 4 rows for each strip, 2 outer rows, and 2 alternating rows down the center.
4. Where one roll of matting ends and another begins, the end of the top strip shall overlap the upper end of the lower strip by 4", shiplap fashion. Reinforce the overlap with a double row of staples spaced 6" apart in a staggered pattern on either side. The discharge end of the matting liner should be similarly secured with 2 double rows of staples.
5. The protective matting can be laid over sprigged areas where small grass plants have been planted. Where ground covers are to be planted, lay the protective matting first and then plant through the matting according to the landscape design.

DETAIL 30 EROSION CONTROL MATTING



EROSION CONTROL MATTING

Construction Specifications

1. Key-in the matting by placing the top ends of the matting in a narrow trench, 6" in depth. Backfill the trench and tamp firmly to conform to the channel cross-section. Secure with a row of staples about 4" down slope from the trench. Spacing between staples is 6".

2. Staple the 4" overlap in the channel center using an 18" spacing between staples.

3. Before stapling the outer edges of the matting, make sure the matting is smooth and in firm contact with the soil.

4. Staples shall be placed 2' apart with 4 rows for each strip, 2 outer rows, and 2 alternating rows down the center.

5. Where one roll of matting ends and another begins, the end of the top strip shall overlap the upper end of the lower strip by 4", shiplap fashion. Reinforce the overlap with a double row of staples spaced 6" apart in a staggered pattern on either side.

6. The discharge end of the matting liner should be similarly secured with 2 double rows of staples.

Note: If flow will enter from the edge of the matting then the area effected by the flow must be keyed-in.

23.0 STANDARD AND SPECIFICATIONS

FOR TREE PROTECTION

Definition

Protection of desirable trees from mechanical and other injury while the land is being developed.

Purpose

To employ the necessary protective measures to insure the survival of desirable trees for shade, beautification, and vegetative cover.

Conditions Where Practice Applies

On areas now occupied by single specimen trees or groups of trees.

Criteria for deciding upon the trees to leave:

1. Aesthetic value: Consideration should be given to autumn foliage, flowering habits, bark and crown characteristics, and type of fruit.
2. Freedom from disease and rot.
3. Life span of trees: Some are considered short-lived trees.
4. Wind firmness: Virginia pine has a very shallow root system, and trees will blow over easily if they have been growing in a closed stand.
5. Wildlife values: Oaks, hickories, and dogwoods, etc. have a high wildlife food value.
6. Comfort index: Summer temperatures are generally ten degrees cooler under stands of hardwoods than pines or cedars.
7. Sudden exposure: Some trees are sensitive to direct sunlight radiated heat from proposed buildings and pavement.
8. Space needed: Give consideration to future growth and relationship to structures, electric and telephone lines, water and sewer lines, and driveways. Mark trees with bright paint or ribbon so there is no doubt as to which trees are to be left and protected from damage during construction.

Criteria for protecting trees:

1. Trees within 25' of a building site and associated grading, parking and utility extensions shall be boxed in to prevent mechanical injury. The box should be as close to the drip line of the tree as possible.
2. Boards will not be nailed to trees during building operations.

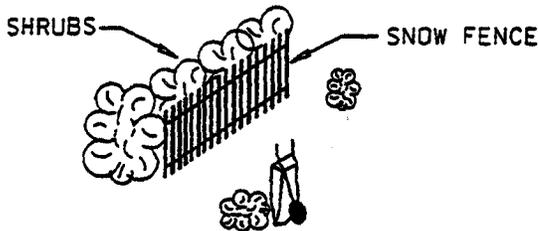
3. Heavy equipment operators will be cautioned to avoid damage to existing tree trunks and roots during land leveling operations. Tunnel under root system when installing utility lines, if possible.
4. Tree trunks and exposed roots and limbs damaged during equipment operations will be cared for as prescribed by a forester or licensed tree expert.
5. Wood chips when spread to a 4" depth can be used in wooded sites to help prevent soil compaction and damage to trees.
6. The use of heavy equipment on root systems of desirable trees must be avoided to prevent soil compaction. All construction should be kept out of the drip line of protected trees. Protective fencing shall be utilized for trees being retained and shall be located at the drip line.
7. Broad leaf trees should receive a heavy application of complete fertilizer to aid their recovery from possible damage caused by construction operations. Fertilization should be done during winter and/or early spring following completion of construction. It should be applied at the following rate: 2 to 4 lbs. of 10-6-4 for each inch of trunk diameter measured at 4 1/2' above ground line. Fertilizer should be applied in holes 1" in diameter 18" deep. Spaced about 2' apart at the drip line of the tree.
8. During the first two summers following construction, it is desirable that the trees receive adequate amounts of water.

References

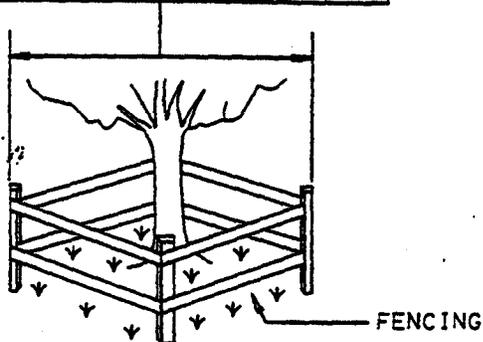
1. Agricultural Information Bulletin 285, "Protecting Trees Against Damage from Construction Work," Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.
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DETAIL 31 TREE PROTECTION

TEMPORARY MEASURES

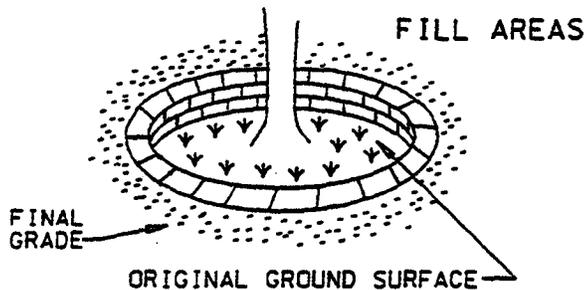
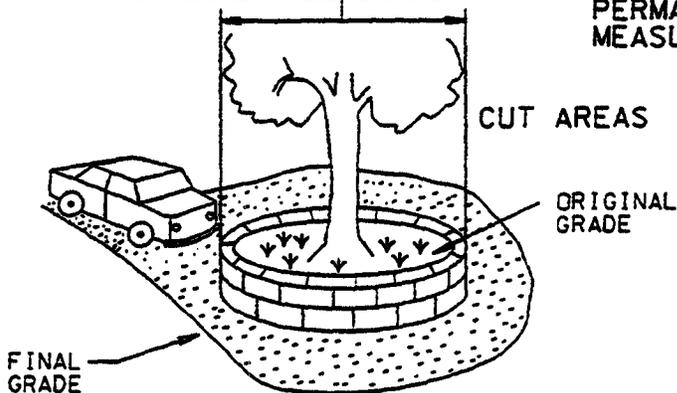


NOTE: ALL PROTECTIVE FENCING SHALL EXTEND BEYOND THE TREE DRIPLINE

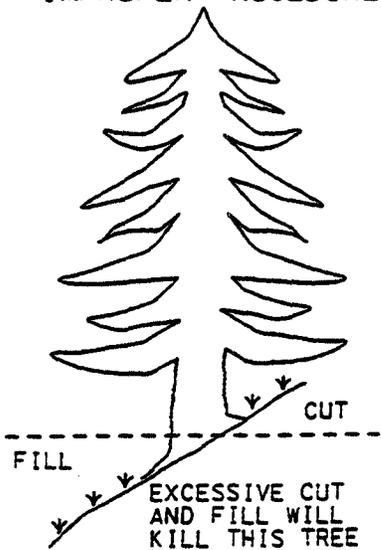


NOTE: ALL PROTECTIVE MEASURES SHALL EXTEND BEYOND THE TREE DRIPLINE

TEMPORARY AND PERMANENT MEASURES



IMPROPER PROCEDURE



PROPER PROCEDURE

