

USDA
NATURAL RESOURCES
CONSERVATION SERVICE
MARYLAND CONSERVATION
PRACTICE STANDARD
CRITICAL AREA PLANTING
CODE 342
(Reported by Acre)

DEFINITION

Planting vegetation, such as trees, shrubs, vines, grasses, or legumes on highly erodible or critically eroding areas.

PURPOSES

This practice may be applied for one or more of the following purposes:

1. To reduce soil erosion by wind and water;
2. To improve water quality by reducing off-site sediment movement;
3. To improve wildlife habitat and visual resources.

**CONDITIONS WHERE PRACTICE
APPLIES**

This practice applies to all land uses where soil stabilization requires using specialized plant species and establishment methods.

Examples of applicable areas include conservation structures, embankments, cuts, fills, mined areas, roadsides, landfills, spoilbanks, filter strips, and recreation areas.

This practice does not apply to tree planting that is primarily intended for production of timber and other forest products. (Refer to the conservation practice standard for Tree/Shrub Establishment, Code 612.)

CONSIDERATIONS

Assess site conditions including surrounding land uses, soils, available moisture during the growing season, and existing vegetation on the site and in adjacent areas, including any noxious weeds that may be present.

Take note of other constraints such as economic feasibility, access, regulatory or program requirements, social effects, and visual aspects.

Consider the need for structural practices, in addition to this vegetative practice, to stabilize a critically eroding site.

Consider the time of year for installation of this practice. Avoid periods of high runoff velocities, or temporarily divert runoff from the planted area. This will allow the vegetation to become well established before it is subjected to storm flows.

Consider long-term maintenance requirements of the established vegetation.

CRITERIA

General Criteria

Grading Plan - The grading plan and practice installation shall be based upon adequate topographic surveys and investigations. The plan shall show the location, slope, cut, fill, and finish elevation of the surfaces to be graded. The plan shall also include auxiliary practices for safe disposal of runoff water, slope stabilization, erosion control, and drainage. Practices such as waterways, ditches, diversions, grade stabilization structures, retaining walls and subsurface drains shall be included where necessary.

Site Preparation - Timber, logs, brush, rocks, stumps and vegetative matter that will interfere with the grading operation or affect the planned stability of fill areas shall be removed and disposed of according to the plan.

Strip and stockpile topsoil in amounts necessary to complete finish grading of all exposed areas requiring topsoil. A minimum 4-inch stripping

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depth shall be used, depending on the particular soil.

Fill material shall be free of brush, rubbish, timber, logs, stumps, and other vegetative matter in amounts that is detrimental to constructing stable fills.

All disturbed areas shall be left with a generally smooth finish and shall be protected from erosion.

Include provisions to safely conduct surface water to storm drains or suitable watercourses and to prevent surface runoff from damaging cut faces and fill slopes. In areas having a high water table, provide subsurface drainage to intercept seepage that would adversely affect slope stability, building foundations, or create undesirable wetness.

Protect adjoining properties from sedimentation associated with excavation and filling operations.

Do not place fill material adjacent to the bank of a stream or channel, unless provisions are made to protect the hydraulic, biological, aesthetic and other environmental functions of the stream.

Plant Materials - Select plant species based on their adaptability to the environmental conditions present and to the planned land use. Herbaceous and/or woody plants may be appropriate. For best results, use species and varieties with proven conservation traits.

Species shall be selected based on:

1. Climatic conditions, such as annual and seasonal rainfall, growing season length, humidity, and USDA Plant Hardiness Zones (see Figure 1);
2. Soil and site conditions such as drainage class, pH, available water holding capacity, slope, aspect, shade, inherent fertility, salinity or alkalinity, flooding or ponding, and levels of toxic elements such as aluminum and heavy metals;
3. Plant characteristics, such as:
 - a. Ease of establishment, persistence, and time needed for full stand establishment;

- b. Growth habit (e.g., sod or bunch) as it relates to surface cover;
- c. Rooting depth and spread as it relates to slope stability;
- d. Resistance to dislodgment by flowing water or wave action at various velocities and depths;
- e. Season of growth (warm or cool) and life cycle (annual, perennial, or biennial);
- f. Fertility and management requirements;
- g. Visual appeal;
- h. Suitability as wildlife food and/or cover.

Plant materials shall either be native to Maryland, or introduced and non-invasive (i.e., not likely to spread beyond the planted area and displace native species). When feasible, select locally native plant species and/or species that are beneficial to wildlife.

Site preparation and planting to establish vegetative cover shall be done at a time and manner to insure survival and growth of selected species. Provide supplemental moisture if and when necessary to assure early survival and establishment of selected species.

Only viable, high quality seed and planting stock shall be used. The method of planting shall include hand or machine planting techniques, suited to achieving proper depths and placement for the selected plant species.

Vegetation may be established by using seed, bare-root seedlings, containerized stock, or balled-and-burlapped stock. Younger planting stock is generally preferred to older stock because younger plants adapt more readily to new conditions.

Protect the planting from unacceptable impacts due to pests, wildlife, livestock, or fire. Exclude livestock as needed to establish the planting.

Control noxious weeds as required by state law.

Additional Criteria for Soil Amendments

Use soil tests to determine the optimum recommendations for both lime and fertilizer. Soil analysis shall be performed by a soil testing laboratory that has been accredited by the North American Proficiency Testing Program, preferably the University of Maryland Soil Testing Laboratory. At a minimum, soil samples taken for nutrient and pH analysis shall be from the soil layer that will be used as the surface layer (top 4 to 6 inches) for seeding. Follow sampling procedures recommended by the laboratory.

Lime - Apply lime to achieve a soil pH of 6.0 if legumes are included in a planting, and 5.5 if only grasses or woody plants are used. Lime materials shall be ground agricultural limestone that contains at least 50% total oxides (calcium plus magnesium oxide). Hydrated lime may be substituted for agricultural lime, except in hydroseeding applications. Do not use burnt lime as a soil amendment.

Pulverized limestone shall be ground to such fineness that at least 50% will pass through a 100-mesh sieve and at least 98% will pass through a 20-mesh sieve. Apply pulverized limestone with a drop spreader when high winds will not interfere with uniform distribution of the material or cause nuisance dust. Pulverized limestone may also be used in a hydroseeding slurry.

Granular limestone shall be of such fineness that at least 30% will pass through a 100-mesh sieve, at least 50% through a 60-mesh sieve, and at least 98% through a 20-mesh sieve. Apply granular limestone with a drop or rotary spreader, but do not use it in a hydroseeding slurry.

Pelletized limestone, a product composed of pellets of pulverized limestone, shall be of a pellet type and size that is recommended by the manufacturer for use with turfgrass. The limestone used in the manufacture of the pelletized limestone product shall meet the minimum fineness requirements for pulverized limestone. Apply pelletized limestone with a drop or rotary spreader, or include it in a hydroseeding slurry.

When a soil test is not feasible, apply lime according to the rates specified as follows:

Soil Texture	Limestone Application Rate	
	Tons/Acre	Lbs./1,000 SF
Clay, clay loam, and highly organic soil	3	135
Sandy loam, loam, silt loam	2	90
Loamy sand, sand	1	45

Limestone applied at rates greater than 50 pounds per 1,000 square feet (or greater than 1 ton per acre) shall be incorporated into the upper 4 to 6 inches of the soil. Limestone applied at lower rates may be incorporated or left on the soil surface.

Fertilizer - The use of commercial fertilizer and other forms of plant nutrients must be in compliance with Maryland nutrient management regulations, as applicable. Apply fertilizer to prepared seedbeds, as needed based on soil test results. Fertilizer applied without a soil test may result in an inefficient quantity of nutrients for plant establishment, or could result in overapplication of nutrients leading to potential water quality problems and excessive weed growth. However, in circumstances when obtaining a soil test is not feasible, and a site is likely to have low nutrient levels, use the following rates for fertilizer applications:

1. Cool-season grass: 500 pounds per acre (or 10 pounds per 1,000 square feet) of 10-20-20 or equivalent;
2. Cool-season grass + legume: 500 pounds per acre (or 10 pounds per 1,000 square feet) of 5-20-20 or equivalent;
3. Warm-season grass or warm-season/cool-season grass mixes: 500 pounds per acre (or 10 pounds per 1,000 square feet) of 0-10-10 or equivalent. Nitrogen is generally not recommended for use during the establishment of warm-season grass because it encourages increased weed competition. However, on sites with very low fertility and

minimal likelihood of weed competition, 30 pounds per acre (0.7 pound per 1,000 square feet) of slow-release N may be applied at the time of planting, or 40 pounds per acre (1 pound per 1,000 square feet) of soluble N after grass emergence.

4. Warm-season grass + legume, or warm-season/cool-season grass mixes + legumes: 500 pounds per acre (or 10 pounds per 1,000 square feet) of 0-10-10 or equivalent. On very low fertility sites where there is minimal weed competition, apply 20 pounds per acre (0.5 pound per 1,000 square feet) of N after emergence.

All fertilizer shall be uniform in composition, free-flowing, and suitable for application by approved equipment. Fertilizers shall be delivered to the site fully labelled according to applicable state fertilizer laws, and shall bear the name, trade name, or trademark and warranty of the producer. When feasible, use slow-release forms of nitrogen to provide nitrogen over a longer period of time, and to reduce nitrogen leaching and runoff.

Organic Amendments - Apply manure and compost at a rate based on a nutrient analysis of that material. Organic amendments to sites shall be recommended only after an evaluation of any potential water quality hazards. To the extent practical, incorporate organic amendments into the upper 4 to 6 inches of the soil with a disk, springtooth harrow, or other suitable equipment.

Additional Criteria for Topsoil

Topsoil shall be added to a site when needed to improve the soil medium for plant establishment and growth. The use of topsoil shall be limited to slopes that are 2:1 or flatter.

Exposed soils shall be topsoiled if they have one or more of the following limiting factors:

1. Very shallow to bedrock or other restrictive layer (e.g., the subsoil is less than 6 inches deep);
2. Extremely acidic (pH less than 5.0); or,
3. Extremely salty (conductivity greater than 500 parts per million, or 4.0 millisiemens per centimeter).

Topsoil may also be used when assurance of improved vegetative growth is desired.

Topsoil Quality - Topsoil shall be friable and loamy, free of debris, stones, or other materials larger than 1.5 inches in diameter. It shall be free of any known viable seeds or plant parts of objectionable weeds such as Johnsongrass, shattercane, thistle, multiflora rose, or others as specified.

Topsoil shall contain no toxic substance that may be harmful to plant growth. Soluble salts shall not be excessive (concentration greater than 500 parts per million). A pH range of 5.5 to 7.5 is required. If pH is less than 5.5, lime shall be applied and incorporated with the topsoil to adjust the pH to between 5.5 and 7.5. A pH of 6.5 is ideal. Topsoil hauled in from off-site shall have a minimum organic matter content of 1% by weight, based on soil test results.

Topsoil Application - Before topsoiling, test the pH of the exposed subsoil. If the subsoil is highly acidic, add ground agricultural limestone at the rate of 4 to 8 tons per acre (200 to 400 pounds per 1,000 square feet). Distribute the lime uniformly, and work it into the subsoil as previously described in the section concerning Soil Amendments.

Immediately before spreading topsoil, the subsoil shall be loosened by disking or scarifying to provide a good bond for the topsoil. Where the slope of the site is flatter than 3:1, loosen the subsoil to a minimum average depth of 2 inches. On steeper slopes (up to 2:1), loosen the subsoil to a depth of 0.5 to 1 inch, or use a bulldozer to track up and down slope to create horizontal check slots that will prevent topsoil from sliding down the slope.

Topsoil shall only be handled when it is dry enough to work (less than field capacity) without damaging soil structure. Do not spread topsoil when it is partly frozen or muddy, or on frozen slopes covered with ice or snow.

Topsoil shall be uniformly applied in a 5 to 8 inch layer, and lightly compacted to a minimum thickness of 4 inches. Subsoil with a pH of 4.0 or less, or containing iron sulfide, shall be covered with a minimum depth of 12 inches of topsoil.

Topsoil placed on slopes greater than 5% shall be promptly limed and fertilized (if needed), seeded, mulched, and tracked with suitable equipment.

Additional Criteria for Seedbed Preparation

Seedbed preparation shall be done when the soil is moist, but not wet. Lime, fertilizer, and other soil amendments shall be evenly applied where needed on the site, as described in previous sections of this standard. Either dry or wet application methods may be suitable.

Slopes flatter than 3:1 - Seedbed preparation shall consist of working the soil to a depth of 3 to 5 inches with a disk or similar equipment. Continue tillage until a reasonably uniform seedbed is prepared.

Slopes 3:1 or steeper - Scarify the soil surface with a bulldozer, heavy chain, hand tools or other equipment that will loosen the soil 0.5 to 1 inch deep. After the soil is loosened, do not work it completely smooth, but leave it in a somewhat roughened condition. Follow the general contour when making the final surface preparation.

Additional Criteria for Seed Quality and Treatment

All seed shall be labeled and meet the requirements of the Maryland State Seed Law. Refer to Table 5 for minimum germination and purity requirements. Seed shall have had a germination test within 12 months prior to the date of sowing. Use of certified seed is preferred. Keep seed cool and dry until planting.

Species with seed lots greater than 50% hard seed shall be dehulled and/or scarified and planted no later than 60 days after scarification.

Grasses that have fluffy seeds shall be planted using specially designed native seed drills. Alternatively, mechanically remove beards or awns from such seeds to facilitate movement through conventional seeding equipment.

Legume seeds shall be inoculated with the proper, viable *Rhizobium* bacteria before planting. Keep inoculant as cool as possible until use, and do not use it later than the date indicated on the package. When hydroseeding, use four times the recommended inoculant rate.

Additional Criteria for Seeding Operations

Seed shall be applied uniformly by hand, cyclone seeder, drill, cultipacker-seeder, or hydroseeder. The preferred method of seeding is by drilling or cultipacker-seeder method because these methods optimize seed to soil contact.

Seeding operations shall be done on the contour to the extent feasible. When a uniform distribution of seed is especially important (e.g., on lawns and athletic fields) and slopes are not extremely steep, apply seed in two directions, each perpendicular to one another. Apply one-half the seeding rate in each direction.

Drill - Seed shall be planted by using a grass drill or cultipacker-type seeder. A grain drill may also be used if it can be calibrated to plant small seeds at the recommended planting rates. As noted above, plant grasses with fluffy seeds by using a specially designed native seed drill. All drills shall have packer wheels, chains, or similar devices to close the seed slot and provide good seed to soil contact. Do not plant small-seeded grasses more than 1/4 to 1/2-inch deep.

Broadcast - Seed may be broadcast by using a cyclone or whirlwind seeder, or by hand. If spread by hand, small or light-seeded species such as redbud or bluestem may be mixed with filler (e.g., sawdust, finely ground corn, or slightly moistened peat moss) to achieve an even distribution. Incorporate seed into the soil 1/8 to 1/4-inch deep by raking or dragging, cultipacking, or tracking with heavy machinery. Raked areas shall be rolled with a weighted roller to provide good seed to soil contact. Do not use broadcast seeding methods during windy conditions.

Hydroseeding - This method is best suited for steep, inaccessible areas where use of a drill or other mechanized equipment is not feasible. Hydroseeding shall be done in two separate operations with seed and fertilizer applied in the first pass, and mulch applied in the second pass. Do not use burnt or hydrated lime when hydroseeding. If legume inoculant is used, complete the seeding within 3 to 4 hours after slurry is mixed, or add a fresh supply of inoculant to the mix. If possible after seeding, track the area up and down slope with heavy machinery such as a bulldozer to improve seed to soil contact.

Additional Criteria for Temporary Seeding and Nurse Crops

When the period of soil exposure is more than two months but less than twelve months, a temporary seeding (usually an annual grass) shall be used to provide short-term cover on disturbed areas. See Table 1 for recommended plant species and planting rates.

Temporary seedings shall be planted as a nurse crop with a permanent seeding mixture when rapidly growing cover is needed. When seeding toward the end of the listed planting dates for permanent seedings, or when conditions are expected to be less than optimal, select an appropriate nurse crop from Table 1 and plant with the permanent seeding mix. Companion seedings of small-seeded grasses shall not exceed 5% (by weight) of the overall permanent seeding mixture. Companion seedings of small grains such as barley, wheat, or oats shall be sown at one-third the rates listed in Table 1. Cereal rye generally should not be used as a nurse crop, unless planting will occur in very late fall beyond the seeding dates for other temporary seedings. Cereal rye has allelopathic properties that inhibit the germination and growth of other plants.

Oats are the recommended nurse crop for warm-season grasses.

When a temporary or permanent seeding cannot be completed because of weather conditions or time of year, apply mulch only (no seeding) as a temporary cover when soil stabilization is needed. Refer to the Mulching section of this standard for application rates and methods.

Additional Criteria for Permanent Seeding

Permanent herbaceous vegetation shall be designed to achieve a minimum stand density of 85 percent ground cover within one year.

Seed Mixes - To establish permanent cover, select grass and legume mixes according to the guidelines listed in Tables 3 and 4.

Planting Dates - Use Figure 1 and Table 2 to determine the recommended planting dates for selected mixes.

Supplemental Watering - If soil moisture is deficient, supply new seedings with adequate

water (a minimum of 1/4-inch twice a day) until vegetation is well established. This is especially necessary when seedings are made in abnormally dry or hot weather or on droughty soils.

Additional Criteria for Mulching

Mulch shall consist of natural and/or artificial non-toxic materials, such as coconut fibers, wood shavings, straw, hay, bark chips, plastic, or fabric of sufficient thickness and durability to achieve the intended effect for the required time period. Tackifiers, emulsions, netting, pinning, or other methods of anchoring mulch shall be sufficiently durable to maintain mulch in place until it is no longer needed.

Mulching is required for critical area plantings on structural measures (e.g., grassed waterways, diversions, embankments, etc.), and shall be applied elsewhere as needed to accomplish one or more of the following purposes:

1. To provide temporary erosion control when planting must be delayed until the proper planting dates, or until plantings become well established;
2. To conserve soil moisture and to aid seed germination and plant survival;
3. To reduce soil temperature fluctuations and frost heaving;
4. To reduce weed growth in planted areas;
5. To reduce surface compaction or crusting, and improve water infiltration.

Mulching may not be needed when critical area plantings are used on field borders, filter strips, highly erodible cropland, and similar areas where crop residue and/or nurse crops will provide sufficient cover after planting.

Soil Stabilization Matting - Biodegradable matting shall be used as needed to provide temporary erosion control until seedlings or other plantings become well established. These materials are especially applicable where high water velocities are expected.

Matting shall have a uniform thickness and distribution of natural or other biodegradable synthetic fibers or cords that freely allow

penetration by water and plant seedlings. The materials shall resist decay for a minimum of 6 months, and shall not contain any harmful chemicals or other materials that may leach into the soil, or reduce the germination and establishment of seedlings.

Biodegradable matting shall be applied on seeded areas and shall be secured to the soil surface according to the manufacturer's instructions.

Permanent geotextiles (non-biodegradable) may also be used where long-term erosion control is needed. These materials shall also be installed according to the manufacturer's instructions.

Straw or Hay Mulch - Straw or hay shall be applied at the rate of 2 tons per acre (90 pounds per 1,000 square feet) immediately following seeding. Straw and hay shall be unweathered and free of any known viable seeds of objectionable weeds such as Johnsongrass, shattercane, thistle, or others as specified.

Spread mulch uniformly by hand or by mechanical methods so that approximately 85% of the soil surface is covered. This will provide erosion protection and allow adequate light penetration for seedling germination. Straw or hay shall not be chopped or finely broken during application.

On sites where mulch is exposed to displacement by wind and water, it shall be anchored immediately after placement. Use one of the following methods, depending on the size of the area, steepness of slope, and costs:

1. **Mulch Netting**. Cover mulch with degradable plastic, jute, or cotton netting. Staple the netting in place using wire staples;
2. **Crimper**. Use a tractor-drawn mulch anchoring coulter (crimper) to cut mulch into the soil surface, so as to anchor part of the mulch and leave part standing upright. Follow the general contours of the site when crimping mulch. Crimping operations are limited to areas accessible by tractor;
3. **Liquid Mulch-Binders**. Use one of the following:
 - a. **Organic and Vegetable-Based Binders**. Mix with water and apply to mulch to form

an insoluble polymer gel binder. Use at rates and under weather conditions as recommended by the manufacturer. These mulch binders shall be physiologically harmless and not impede the germination and growth of desired vegetation;

- b. **Synthetic Binders**. Mix with water and apply to mulch to form an insoluble high polymer synthetic binder. Use at rates and under weather conditions as recommended by the manufacturer.

Wood Fiber or Paper Fiber Mulch - Mulch made from wood, paper, or plant fibers shall be applied at the rate of 2,000 pounds per acre, or as recommended by the product manufacturer. Mulch shall not contain any germination or growth inhibiting materials. It may be applied by hydroseeder, but shall not be mixed in the tank with seed. Use shall be limited to flatter slopes and during optimum seeding periods in the spring and fall. Do not use on steep slopes or in concentrated flow areas.

Pelletized Mulch - Dry pellets of compressed and extruded paper and/or wood fiber products shall be applied by hand or mechanical spreader at the rate of 60 to 75 pounds per 1,000 square feet, in accordance with the manufacturer's recommendations. Pelletized mulch may contain co-polymers, tackifiers, fertilizers, and coloring agents. Apply 1/4 to 1/2-inch of water after spreading pelletized mulch to activate and expand the mulch and to provide sufficient soil coverage. This mulch material is especially applicable for small lawns or renovation areas where weed-free mulch is desirable, or straw mulch and tackifiers are not practical.

Bark Mulch - Shredded or chipped hardwood bark or pine bark mulch shall be applied to a depth of 2 to 3 inches around plantings of trees, shrubs, groundcovers, and vines. Pine bark mulch generally decomposes more slowly and is less toxic to plants than hardwood bark mulch.

Shredded bark and bark chips ("nuggets") shall be well-aged, and applied to provide at least 85% ground cover. A minimum 3-foot diameter circle of mulch is recommended around each tree or shrub. Do not mulch within 3 inches of the trunk. On steep slopes, use shredded bark mulch, rather than chips, because it is less subject to movement by water.

Additional Criteria for Sod

Sod Quality and Treatment - Sod used shall be state certified sod which is at least one year old but not older than 3 years. Commonly available sod types include Kentucky Bluegrass blends, and Tall Fescue/Kentucky Bluegrass mixes.

Sod shall be machine cut to uniform thickness of 3/4-inch, plus or minus 1/4-inch, at the time of cutting. Measurement of thickness shall exclude top growth or thatch.

Standard size sections of sod shall be strong enough to support their own weight and retain their shape when suspended vertically with a firm grasp of the upper 10% of the section.

Individual pieces of sod shall be cut to the supplier's width and length. Maximum allowable deviation from standard widths and lengths shall be no more than 5%.

Sod shall be harvested, delivered, and installed within a period of 36 hours. Sod not transplanted within this period shall be inspected and approved prior to its installation.

Do not harvest or transplant sod when the moisture content (excessively wet or dry) may adversely affect its survival.

Planting Dates - Use Figure 1 and Table 2 to determine the appropriate planting dates for sod.

The optimum planting period is in early fall, followed by the spring planting period. Sod may be planted during the summer if supplemental watering will be provided until the sod is well established. The fall planting season is limited by the amount of time the sod has to develop roots before the ground freezes. Newly sodded areas usually need 4 to 6 weeks before the sod is sufficiently rooted. Similarly, the spring planting season is limited by the high temperatures and drought of summer, unless supplemental water will be provided.

Installation - Prior to sodding, the soil surface shall be cleared of roots, brush, trash, debris, and other objects that would interfere with planting. Based on a soil test, apply lime and fertilizer as needed, and mix into the top 3 inches of soil. Then rake the site smooth in preparation for laying the sod.

During periods of high temperature, lightly water the soil surface immediately before laying the sod. Lay sod strips lengthwise on the contour, never up and down the slope, starting at the bottom of the slope and working up. On steep slopes, use ladders to facilitate the work and prevent damage to the sod.

Lay sod strips in staggered rows, with joints butted tightly together to prevent voids. Roll or tamp the sod immediately following placement to insure solid contact of root mat and soil surface. Do not overlap the sod strips.

On slopes greater than 3:1, secure sod to the soil surface with wooden pegs or wire staples.

Where surface water cannot be diverted from flowing over the face of a sodded slope, install a capping strip of heavy jute or plastic netting, properly secured, along the crown of the slope and edges to provide extra protection against lifting and undercutting of sod. Use the same technique to anchor sod in water-carrying channels and other critical areas. Use wire staples to anchor netting in channel work.

Supplemental Watering - Immediately following installation, sod shall be watered until moisture penetrates the soil layer beneath the sod to a depth of 4 inches. Maintain optimum moisture for at least 2 weeks by lightly watering the sod on a regular (usually daily) basis, unless sufficient rainfall has occurred. Do not allow the sod to dry out completely. After the sod begins to take root, reduce the frequency of watering and increase the amount of water applied per watering. This encourages the development of a deep root system and ultimately reduces the amount of water needed.

Additional Criteria for Groundcovers

On sites where grass is difficult to grow or maintain, other perennial groundcovers may be used to control erosion. Groundcovers are low-growing herbaceous plants, vines, and creeping shrubs that spread quickly to form a dense cover. These plants should not be expected to provide erosion control or prevent soil slippage on sites that are inherently unstable due to soil texture, structure, water movement, or excessive slope.

Selection of Plant Species - Low-maintenance groundcovers are available to suit a variety of

conditions, especially for small areas around homes and commercial buildings. These plants generally require more care than turf during the initial establishment period, but may require less care after establishment.

Species recommendations may be found by consulting publications in the "References" section of this standard. Be cautious of using species that have aggressive growth habits and may spread beyond the planted area, especially if the planting is near a neighboring property or a natural area such as a shoreline or woodland. Species such as English Ivy (*Hedera helix*) and Periwinkle (*Vinca minor*) tend to grow rapidly once established, and should not be used except under well-contained conditions.

Planting Dates - Use Figure 1 and Table 2 to determine the appropriate planting dates for the different types of plant materials.

Installation - Soil shall be prepared by incorporating 2 inches of compost into the upper 8 inches of soil. If needed based on a soil test, incorporate lime and fertilizer into the soil. In the absence of a soil test for very small sites (e.g., in home landscaping areas), fertilizer may be added at the rate of 2 pounds of 5-10-10 grade fertilizer (or equivalent) per 100 square feet.

Install the plants at a spacing that is based on their present size, expected rate of growth and size at maturity, and how quickly a complete cover is desired. In general, use a spacing of one plant for every 1 to 4 square feet, and stagger the spacing of plants between rows.

Cover the entire planted slope with a mulch that will provide sufficient erosion control during the establishment period. Refer to the Mulching section of this standard for application rates and methods.

Additional Criteria for Trees and Shrubs

If trees and shrubs will be used on a critical area, the soil surface shall be stabilized with mulch or with a low-growing herbaceous planting (e.g., creeping red fescue) to control erosion until the woody plants are large enough to serve that purpose.

Refer to the Conservation Practice Standard for Conservation Cover (Code 327) for a selected list

of native tree and shrub species that may be used. Other trees and shrubs that are native to Maryland, or are introduced and are non-invasive (i.e., not likely to spread beyond the planted area and displace native species), may also be suitable. Follow the establishment recommendations in the Maryland Job Sheet for Trees and Shrubs.

For selection and use of trees and shrubs as part of a soil bioengineering system for upland slopes, refer to Chapter 18 of the Engineering Field Handbook.

SPECIFICATIONS

Plans and specifications for establishment and maintenance of a critical area planting shall be prepared for each site or management unit according to the Considerations, Criteria, and Operation and Maintenance described in this standard. They shall be recorded on specification sheets, job sheets, narrative statements in conservation plans, or other acceptable documentation.

When this practice is used to specify the vegetative component of another practice (e.g., grassed waterway, filter strip, pond, etc.), plans and specifications shall meet the requirements of this standard and the other applicable standard to achieve the intended purpose of the practice. The completed work shall be checked and documented to verify that the practice was completed according to the drawings and specifications of both standards. Documentation shall be in accordance with the section "Supporting Data and Documentation" in both standards.

OPERATION AND MAINTENANCE

General Requirements for All Plantings

Take corrective actions as needed to replace destroyed plant material or dislodged mulching material. Reshape the soil surface and replant areas where prolonged slope instability is present. Where vegetative efforts have failed, reassess the suitability of the chosen species for the site, and the need for structural measures to complement vegetative measures.

Control invasions by undesirable plants by pulling, mowing, or spraying with a selective herbicide. Where wildlife habitat is a concern, do not mow during the primary nesting season (April 15 to August 15). Control noxious weeds as required by state law.

Inspect for insects and diseases, and if an incidence threatens stand survival, take corrective action to bring the pest under control.

If fertilizer is used, it must be applied in compliance with Maryland nutrient management regulations, as applicable.

Grasses and Legumes

During the establishment period, monitor plantings for germination success, water stress, pest problems, and damage by erosion. After one full year from planting, replant all areas with less than 85% plant cover according to the following recommendations:

1. If the stand provides less than 40% ground cover, reestablish following the original seedbed preparation, lime, fertilizer, and seeding recommendations;
2. If the stand provides 40 to 84% ground cover, overseed and fertilize using one-half the original rate. On small areas, reseeding may be accomplished by broadcasting and lightly raking the seed. For larger areas, use of a grass drill or cultipacker-seeder is preferable.

Spring seedings may require an application of fertilizer between September 1 and October 15, at least every two years, according to soil test recommendations. In lieu of a soil test, apply 30 pounds per acre (0.7 pounds per 1,000 square feet) of N, P205 and K20.

Fall seedings may require the above fertilization between March 15 and May 1 the following spring.

Mixtures dominated by legumes may only need topdressing once every three years according to soil test recommendations.

If a slow release form of nitrogen (such as Ureaform or Osmocote) was used, a follow-up topdressing of nitrogen may not be necessary for several years.

Lime according to soil test recommendations at least once every five years. In lieu of a soil test, apply lime at the rate of 1 ton per acre (45 pounds per 1,000 square feet).

Groundcovers

Use a soil test analysis to determine the need for lime and fertilizer. In lieu of a soil test, a general recommendation is to apply 2 to 3 pounds per 100 square feet of 5-10-10 fertilizer in the fall or early spring. Spread 2 to 3 inches of organic mulch such as shredded hardwood or pine bark mulch (or chips) to reduce evaporation of moisture from the soil and help reduce invasion by weeds.

Use hand tools to remove weeds from between plants. Some perennial weeds, such as thistle and dandelion, are difficult to remove by hand weeding, and may require spot treatment with a nonselective broadleaf herbicide. Care must be taken to avoid herbicide contact with the desired groundcovers or vines, because they are susceptible to being killed or severely damaged by nonselective herbicides. Follow all label directions when using herbicides.

Trees and Shrubs

Follow the maintenance recommendations in the Maryland Job Sheet for Trees and Shrubs.

SUPPORTING DATA AND DOCUMENTATION

General Requirements for All Plantings

The following is a list of the minimum data and documentation to be recorded in the case file:

1. Field location and extent of planting in acres, and assistance notes. Also note the location of the planting on the conservation plan map. Assistance notes shall include dates of site visits, name or initials of the person who made the visit, specifics as to alternatives discussed, decisions made, and by whom;
2. Completed copy of the appropriate Job Sheet(s) or other specifications, and management plans. The following items shall be addressed, as appropriate:
 - a. Method of site preparation and type of seedbed preparation;
 - b. Type of problem site, or Conservation Practice Code to be seeded (if used as the planting component of another conservation practice);
 - c. Species and rates to be seeded/planted;
 - d. Seeding/planting dates;
 - e. Rate and type of soil amendments to be applied;
 - f. Rate and type of mulch and anchoring methods.

Additional Documentation for Construction Check Data/As-Built

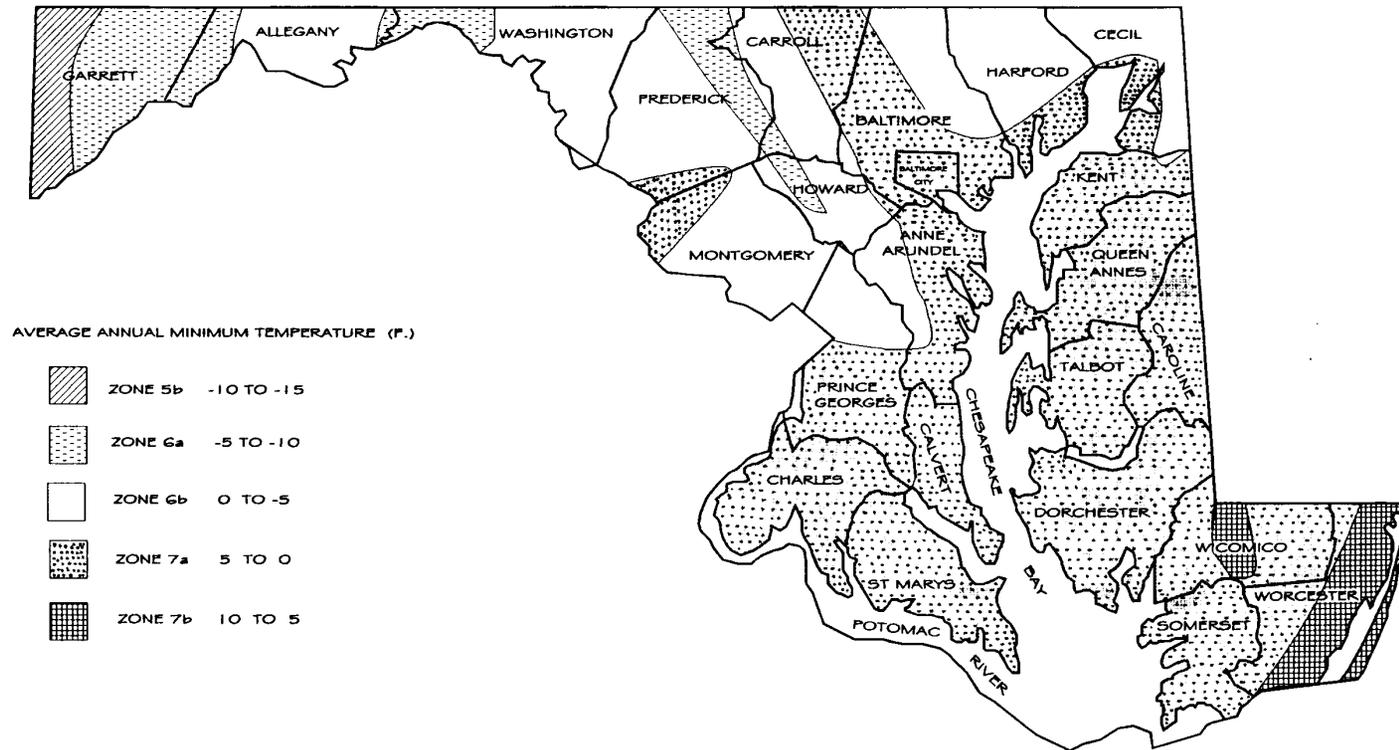
In addition to the general requirements listed above, the following is a list of minimum documentation to be included in the case file when Critical Area Planting, Code 342, is used to specify the planting component of structural practices:

1. Assistance notes shall include inspection date(s), name of the person who performed the inspection(s), specifics as to what was inspected, alternatives and adjustments discussed, decisions made and by whom;
2. Dimensions of the stabilized area;
3. Certification statement on seeding/planting;
4. Final quantities, and documentation for any quantity changes. Include materials certification when requested;
5. Sign and date check notes and plans to include the statement that the practice meets or exceeds the requirements of the NRCS conservation practice standard.

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FIGURE 1: USDA Plant Hardiness Zones for Maryland



Plant Hardiness Zones delineate areas where a species can be successfully established based on average annual minimum temperatures.

TABLE 1: Temporary Seeding for Site Stabilization

Plant Species	Seeding Rate ^{1/}		Seeding Depth (inches) ^{2/}	Recommended Seeding Dates by Plant Hardiness Zone ^{3/}		
	lbs./ac.	lbs./1,000 sq.ft.		5b and 6a	6b	7a and 7b
<i>Cool-Season Grasses</i>						
Annual Ryegrass <i>Lolium perenne</i> <i>ssp. multiflorum</i>	40	1.0	0.5	Mar 15 to May 31 Aug 1 to Sep 30	Mar 1 to May 15 Aug 1 to Oct 15	Feb 15 to Apr 30 Aug 15 to Nov 30
Barley <i>Hordeum vulgare</i>	96	2.2	1.0	Mar 15 to May 31 Aug 1 to Sep 30	Mar 1 to May 15 Aug 1 to Oct 15	Feb 15 to Apr 30 Aug 15 to Nov 30
Oats <i>Avena sativa</i>	72	1.7	1.0	Mar 15 to May 31 Aug 1 to Sep 30	Mar 1 to May 15 Aug 1 to Oct 15	Feb 15 to Apr 30 Aug 15 to Nov 30
Wheat <i>Triticum aestivum</i>	120	2.8	1.0	Mar 15 to May 31 Aug 1 to Sep 30	Mar 1 to May 15 Aug 1 to Oct 15	Feb 15 to Apr 30 Aug 15 to Nov 30
Cereal Rye <i>Secale cereale</i>	112	2.8	1.0	Mar 15 to May 31 Aug 1 to Oct 31	Mar 1 to May 15 Aug 1 to Nov 15	Feb 15 to Apr 30 Aug 15 to Dec 15
<i>Warm-Season Grasses</i>						
Foxtail Millet <i>Setaria italica</i>	30	0.7	0.5	Jun 1 to Jul 31	May 16 to Jul 31	May 1 to Aug 14
Pearl Millet <i>Pennisetum glaucum</i>	20	0.5	0.5	Jun 1 to Jul 31	May 16 to Jul 31	May 1 to Aug 14

TABLE 1 NOTES:

- Seeding rates for the warm-season grasses are in pounds of Pure Live Seed (PLS). Actual planting rates shall be adjusted to reflect percent seed germination and purity, as tested. Adjustments are usually not needed for the cool-season grasses.

Seeding rates listed above are for temporary seedings, when planted alone. When planted as a nurse crop with permanent seed mixes, use 1/3 of the seeding rate listed above for barley, oats, and wheat. For smaller-seeded grasses (annual ryegrass, pearl millet, foxtail millet), do not exceed more than 5% (by weight) of the overall permanent seeding mix. Cereal rye generally should not be used as a nurse crop, unless planting will occur in very late fall beyond the seeding dates for other temporary seedings. Cereal rye has allelopathic properties that inhibit the germination and growth of other plants. If it must be used as a nurse crop, seed at 1/3 of the rate listed above.

Oats are the recommended nurse crop for warm-season grasses.

- For sandy soils, plant seeds at twice the depth listed above.
- The planting dates listed are averages for each Zone, and may require adjustment to reflect local conditions, especially near the boundaries of the zone.

TABLE 2: Recommended Planting Dates for Permanent Cover in Maryland ^{1/}

Type of Plant Material	Plant Hardiness Zones		
	5b and 6a	6b	7a and 7b
Seeds - Cool-Season Grasses (includes mixes with forbs and/or legumes)	Mar 15 to May 31 Aug 1 to Sep 30	Mar 1 to May 15 Aug 1 to Oct 15	Feb 15 to Apr 30 Aug 15 to Oct 31 Nov 1 to Nov 30♦
Seeds - Warm-Season/Cool-Season Grass Mixes (includes mixes with forbs and/or legumes)	Mar 15 to May 31♦♦ Jun 1 to Jun 15*	Mar 1 to May 15♦♦ May 16 to Jun 15*	Feb 15 to Apr 30♦♦ May 1 to May 31*
Sod - Cool-Season	Mar 15 to May 31 Jun 1 to Aug 31* Sep 1 to Nov 1*✦	Mar 1 to May 15 May 16 to Sep 14* Sep 15 to Nov 15*✦	Feb 15 to Apr 30 May 1 to Sep 30* Oct 1 to Dec 1*✦
Unrooted Woody Materials; Bare-Root Plants; Bulbs, Rhizomes, Corms, and Tubers ^{2/}	Mar 15 to May 31 Jun 1 to Jun 30*	Mar 1 to May 15 May 16 to Jun 30*	Feb 15 to Apr 30 May 1 to Jun 30*
Containerized Stock; Balled-and-Burlapped Stock	Mar 15 to May 31 Jun 1 to Jun 30* Sep 1 to Nov 15*✦	Mar 1 to May 15 May 16 to Jun 30* Sep 15 to Nov 30*✦	Feb 15 to Apr 30 May 1 to Jun 30* Oct 1 to Dec 15*✦

TABLE 2 NOTES:

- The planting dates listed are averages for each zone. These dates may require adjustment to reflect local conditions, especially near the boundaries of the zones. When seeding toward the end of the listed planting dates, or when conditions are expected to be less than optimal, select an appropriate nurse crop from Table 1 and plant with the permanent seeding mix. (See Table 1, Note 1, for more information.)
 - When planted during the growing season, most of these materials must be purchased and kept in a dormant condition until planting. Bare-root grasses are the exception—they may be supplied as growing (non-dormant) plants.
 - ♦ Additional planting dates for the lower Coastal Plain, dependent on annual rainfall and temperature trends. Recommend adding a nurse crop, as noted above, if planting during this period.
 - ♦♦ Warm-season grasses need a soil temperature of at least 50 degrees F in order to germinate. If soil temperatures are colder than 50 degrees, or moisture is not adequate, the seeds will remain dormant until conditions are favorable. In general, planting during the latter portion of this period allows more time for weed emergence and weed control prior to planting. When selecting a planting date, consider the need for weed control vs. the likelihood of having sufficient moisture for later plantings, especially on droughty sites.
- * Additional planting dates during which supplemental watering may be needed to ensure plant establishment.
- ✦ Frequent freezing and thawing of wet soils may result in frost-heaving of materials planted in late fall, if plants have not sufficiently rooted in place. Sod usually needs 4 to 6 weeks to become sufficiently rooted. Large containerized and balled-and-burlapped stock may be planted into the winter months as long as the ground is not frozen and soil moisture is adequate.

TABLE 3: Recommended Permanent Seeding Mixtures by Site Condition or Purpose													
Site Condition or Purpose of the Planting	Recommended Mix (see Table 4)												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Steep Slopes, Roadsides	✓	✓	✓	◆	✓	◆				◆	◆	✓	✓
Sand and Gravel Pits, Sanitary Landfills	✓	✓	✓	◆	✓	◆				◆	◆	✓	
Salt-Damaged Areas	◆												✓
Mine Spoil, Dredged Material, and Spoil Banks	◆		✓	◆	◆								
Utility Rights-of-Way	✓	✓	✓	✓	✓	✓	◆			✓	✓	✓	
Dikes and Dams	◆	◆	✓	◆		✓	✓	◆		✓	✓	✓	
Berms, Low Embankments (<u>not</u> on Ponds)	✓	✓	✓	✓	✓	✓	◆	◆		✓	✓	✓	◆
Pond and Channel Banks, Streambanks	✓	✓	✓	✓	◆	◆	◆			◆	◆		
Grassed Waterways, Diversions, Terraces, Spillways	◆				◆	✓	✓	◆	✓		✓		◆
Bottom of Drainage Ditches, Swales, Detention Basins				◆		✓	◆			◆	✓		✓
Field Borders, Filter Strips, Contour Buffer Strips	✓	✓	✓	◆	◆	✓	◆	✓	✓	✓	✓	✓	◆
Wastewater Treatment Strips and Areas								✓	◆	◆			
Heavy Use Areas (Grass Loafing Paddocks for Livestock)								✓					
Athletic Fields, Residential and Commercial Lawns							◆	✓	✓		✓		
Recreation Areas							✓	✓	✓		✓		

TABLE 3 NOTES:

- ✓ Recommended mix for this site condition or purpose.
- ◆ Alternative mix, depending on site conditions.

TABLE 4: Selected List of Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate ^{1/}		Soil Drainage Class ^{2/}	Max. Height (feet)	Maint. Level ^{3/}	Remarks
		lbs./ac.	lbs./1000 sq. ft.				
<i>WARM-SEASON/COOL-SEASON GRASS MIXES</i>							
1. SELECT ONE WARM-SEASON GRASS:							
Switchgrass <i>Panicum virgatum</i> OR	Blackwell, Carthage, Cave-in-Rock, or Shelter	10	0.23	E - P	4 - 7	C - D	All species are native to Maryland. Plant this mix with a regular grass drill. Coastal panicgrass is best adapted to Zones 7a and 7b. Creeping red fescue is a cool-season grass that will provide erosion protection while the warm-season grass (switchgrass or coastal panicgrass) is becoming established.
Coastal Panicgrass <i>Panicum amarum</i> var. <i>amarulum</i>	Atlantic	10	0.23				
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	15	0.34				
AND ADD:							
Partridge Pea <i>Chamaecrista fasciculata</i>	Common	4	0.09	E - P	4 - 7	C - D	Switchgrass, coastal panicgrass, the 'Dawson' variety of creeping red fescue, and partridge pea are moderately salt-tolerant. Do not use bush clover or wild indigo on wet sites.
Bush Clover <i>Lespedeza capitata</i>	Common	2	0.05				
Wild Indigo <i>Baptisia tinctoria</i>	Common	2	0.05				
PLUS ONE OF THE FOLLOWING LEGUMES:							
2. Big Bluestem <i>Andropogon gerardii</i>							
Indiangrass <i>Sorghastrum nutans</i>	Rumsey	6	0.14	E - MW	6 - 8	C - D	All species are native to Maryland. The indiagrass and bluestems have fluffy seeds. Plant with a specialized native seed drill. Creeping red fescue is a cool-season grass that will provide erosion protection while the warm-season grasses are becoming established.
Little Bluestem <i>Schizachyrium scoparium</i>	Aldous or Blaze	4	0.09				
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	15	0.34				
PLUS ONE OF THE FOLLOWING LEGUMES:							
Partridge Pea <i>Chamaecrista fasciculata</i>	Common	4	0.09	E - MW	6 - 8	C - D	All species are native to Maryland. The indiagrass and bluestems have fluffy seeds. Plant with a specialized native seed drill. Creeping red fescue is a cool-season grass that will provide erosion protection while the warm-season grasses are becoming established.
Bush Clover <i>Lespedeza capitata</i>	Common	2	0.05				
Wild Indigo <i>Baptisia tinctoria</i>	Common	2	0.05				
Showy Tick-Trefoil <i>Desmodium canadense</i>	Common	1	0.02	E - MW	6 - 8	C - D	All species are native to Maryland. The indiagrass and bluestems have fluffy seeds. Plant with a specialized native seed drill. Creeping red fescue is a cool-season grass that will provide erosion protection while the warm-season grasses are becoming established.

TABLE 4: Selected List of Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate ^{1/}		Soil Drainage Class ^{2/}	Max. Height (feet)	Maint. Level ^{3/}	Remarks
		lbs./ac.	lbs./1000 sq .ft.				
<i>WARM-SEASON/COOL-SEASON GRASS MIXES</i>							
3. SELECT <u>THREE</u> GRASSES:							
Deertongue <i>Dichanthelium clandestinum</i>	Tioga	20	0.46	E - MW	4 - 6	C - D	Excellent for excessively droughty, low pH (acidic) soils. Sheep fescue, Canada wild rye, and redtop are cool-season grasses that will provide erosion protection while the warm-season grass (deertongue) is becoming established. Common lespedeza ('Kobe' variety) is more tolerant of low acidity and high manganese concentrations than Korean lespedeza. These lespedezas are reseeding annuals.
Sheep Fescue <i>Festuca ovina</i> OR	Common or Bighorn	20	0.46				
Canada Wild Rye <i>Elymus canadensis</i>	Common	3	0.07				
Redtop <i>Agrostis gigantea</i>	Streaker	1	0.02				
PLUS <u>ONE</u> OF THE FOLLOWING LEGUMES:							
Common Lespedeza <i>Lespedeza striata</i>	Kobe	10	0.23				
Korean Lespedeza <i>Lespedeza stipulacea</i>	Climax or Rowan	10	0.23				
4. Deertongue <i>Dichanthelium clandestinum</i>							
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Tioga	15	0.34	W - P	2 - 3	C - D	Use Virginia wild rye on moist, shady sites. Use Canada wild rye on droughty sites.
Virginia Wild Rye <i>Elymus virginicus</i> OR	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	20	0.46				
Common	Common	5	0.11				
Canada Wild Rye <i>Elymus canadensis</i>	Common	5	0.11				

TABLE 4: Selected List of Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate ^{1/}		Soil Drainage Class ^{2/}	Max. Height (feet)	Maint. Level ^{3/}	Remarks
		lbs./ac.	lbs./1000 sq. ft.				
COOL-SEASON GRASS MIXES							
5. SELECT TWO GRASSES:							
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i> OR	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	20	0.46				Use creeping red fescue in heavy shade and on moist sites.
Hard Fescue <i>Festuca trachyphylla</i>	Attila or Aurora	20	0.46				Perennial ryegrass and redtop will establish more rapidly than either fescue. Redtop tolerates wet sites better than ryegrass.
Perennial Ryegrass <i>Lolium perenne</i> OR	Blazer (II), Pennfine	10	0.23				
Redtop <i>Agrostis gigantea</i>	Streaker	1	0.02	E - SP	2 - 3	B - D	Flatpea will suppress woody vegetation. It should be planted in the spring, or as a dormant seeding in late fall or winter. It must be incorporated into the soil or covered with mulch. It may not be winter-hardy if planted late summer - fall. Caution: Flatpea can spread aggressively, and can be toxic to livestock.
AND ADD THE FOLLOWING LEGUME:							
Flatpea <i>Lathyrus sylvestris</i>	Lathco	15	0.34				
6. Tall Fescue <i>Lolium arundinaceum</i> (formerly <i>Festuca arundinacea</i>)							
Perennial Ryegrass <i>Lolium perenne</i>	Blazer (II), Pennfine	25	0.57				
PLUS ONE OF THE FOLLOWING LEGUMES:							
Birdsfoot Trefoil <i>Lotus corniculatus</i>	Empire, Viking, Norcen, Leo	8	0.18	W - SP	2 - 3	C - D	Birdsfoot trefoil is suitable for use only in Zones 5b and 6a.
White Clover <i>Trifolium repens</i>	Common	5	0.11				
7. Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>							
Kentucky Bluegrass <i>Poa pratensis</i>	Recommended MD turf-types ^{4/}	15	0.34	W - MW	1 - 2	C - D	This mix has good shade tolerance.

TABLE 4: Selected List of Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate ^{1/}		Soil Drainage Class ^{2/}	Max. Height (feet)	Maint. Level ^{3/}	Remarks
		lbs./ac.	lbs./1000 sq. ft.				
COOL-SEASON GRASS MIXES							
8. Tall Fescue <i>Lolium arundinaceum</i> (formerly <i>Festuca arundinacea</i>)	Recommended MD turf-types ^{4/}	100	2.3	E - SP	2 - 3	A - D	Tall fescue produces a dense turf if frequently mowed, but tends to be clumpy if mowed only occasionally. For best results, recommend using a blend of 3 cultivars. Use low-endophyte cultivars in areas where livestock may graze.
9. SELECT ONE SPECIES OF FESCUE:							
Tall Fescue <i>Lolium arundinaceum</i> (formerly <i>Festuca arundinacea</i>) OR	Recommended MD turf-types ^{4/}	60	1.38				Good for highly managed athletic fields.
Hard Fescue <i>Festuca trachyphylla</i>	Attila or Aurora	40	0.92				Tall fescue is more suitable for compacted, high use areas and on moist sites.
AND ADD:							
Kentucky Bluegrass <i>Poa pratensis</i>	Recommended MD turf-types ^{4/}	40	0.92	W - SP	2 - 3	A - B	Hard fescue produces finer-textured turf with more shade tolerance.
Perennial Ryegrass <i>Lolium perenne</i>	Blazer (II), Pennfine	20	0.46				Use tall fescue instead of hard fescue for wastewater treatment strips and areas. For best results, recommend using a blend of 3 cultivars each for tall fescue and Kentucky bluegrass.
10. Orchardgrass <i>Dactylis glomerata</i>	Any	25	0.57				Low maintenance mix that is easy to establish.
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	10	0.23				
Redtop <i>Agrostis gigantea</i>	Streaker	1	0.02	W - SP	2 - 3	C - D	
Alsike Clover <i>Trifolium hybridum</i>	Common	3	0.07				Alsike clover can be toxic to horses.
White Clover <i>Trifolium repens</i>	Common	3	0.07				Omit the clovers if using this mix for wastewater treatment strips and areas.

TABLE 4: Selected List of Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate ^{1/}		Soil Drainage Class ^{2/}	Max. Height (feet)	Maint. Level ^{3/}	Remarks
		lbs./ac.	lbs./1000 sq. ft.				
COOL-SEASON GRASS MIXES							
11. Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	30	0.69	E - MW	2 - 3	B - D	
Chewings Fescue <i>Festuca rubra</i> ssp. <i>commutata</i>	Common	30	0.69				
Kentucky Bluegrass <i>Poa pratensis</i>	Recommended MD turf-types ^{4/}	20	0.46				
OPTIONAL ADDITION Rough Bluegrass <i>Poa trivialis</i>	Common	15	0.34				
12. Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	25	0.57	E - MW	2 - 3	C - D	Attractive mix of fine fescues and wildflowers for low maintenance conditions. Once well-established, the grasses may tend to outcompete the wildflowers. Wildflowers are best established by broadcasting and cultipacking on a prepared seedbed. Drilling can be also used, but care must be taken so that seeds are not drilled too deep. Hydroseeding is not recommended for this mix if wildflowers are used. (They have very small seeds.)
Hard Fescue <i>Festuca trachyphylla</i>	Attila or Aurora	25	0.57				
Sheep Fescue <i>Festuca ovina</i>	Common or Bighorn	25	0.57				
PLUS WILDFLOWER MIX: Black-eyed Susan <i>Rudbeckia hirta</i>	Common	2	0.05				
Lance-leaved Coreopsis <i>Coreopsis lanceolata</i>	Common	2	0.05				
Purple Coneflower <i>Echinacea purpurea</i>	Common	2	0.05				
Partridge Pea <i>Chamaecrista fasciculata</i>	Common	5	0.11				
OR ADD CLOVER MIX: White Clover <i>Trifolium repens</i>	Common	3	0.07				
Red Clover <i>Trifolium pratense</i>	Any	3	0.07				

TABLE 4: Selected List of Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate ^{1/}		Soil Drainage Class ^{2/}	Max. Height (feet)	Maint. Level ^{3/}	Remarks
		lbs./ac.	lbs./1000 sq.ft.				
<i>COOL-SEASON GRASS MIXES</i>							
13. Alkali Saltgrass <i>Puccinellia distans</i>	Fults or Salty	20	0.46	W - P	2 - 3	B - D	This is the recommended mix for saline sites. Saltgrass will persist only under saline conditions. For best results, use only the 'Dawson' variety of creeping red fescue. It is a salt-tolerant variety.
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson	15	0.34				
Fowl Meadowgrass <i>Poa palustris</i>	Common	2	0.05				
<u>OPTIONAL ADDITION</u>							
Creeping Bentgrass <i>Agrostis stolonifera</i>	Seaside	2	0.05				Add bentgrass for wetter conditions.

TABLE 4 NOTES:

- Seeding Rates:** Seeding rates for the warm-season grasses are in pounds of Pure Live Seed (PLS). Actual planting rates shall be adjusted to reflect percent seed germination and purity, as tested. Adjustments are usually not needed for the cool-season grasses, legumes, or wildflowers. All legume seeds shall be inoculated before planting with the appropriate *Rhizobium* bacteria. When feasible, hard-seeded legumes should be scarified to improve germination.
- Soil Drainage Class** (refer to the county soil survey for further information):
E - Excessively Drained; W - Well Drained; MW - Moderately Well Drained; SP - Somewhat Poorly Drained; P - Poorly Drained.
- Maintenance Level:**
A - Intensive mowing (every 2 - 4 days), fertilization, lime, insect and weed control, and watering (examples: high maintenance lawns and athletic fields).
B - Frequent mowing (every 4 - 7 days), occasional fertilization, lime, pest control, and watering (examples: residential, school, and commercial lawns).
C - Periodic mowing (every 7 - 14 days), occasional fertilization and lime (examples: residential lawns, parks).
D - Infrequent or no mowing, fertilization, or lime after the first year of establishment (examples: wildlife areas, roadsides, steep banks)

TABLE 4 NOTES (Continued):

4. Turf-type cultivars of Tall Fescue and Kentucky Bluegrass shall be selected based on recommendations of the University of Maryland Cooperative Extension Service, Agronomy Mimeo 77. (See the "References" section of this standard.) Recommendations in the April, 2000 publication are as follows:

A. Kentucky Bluegrass –

1. The following Kentucky bluegrass cultivars are suitable for general use, and are also noted for shade tolerance:

America	Coventry	Quantum Leap
Ascot	Liberator	Showcase
Brilliant	Moonlight	SR 2000
Champagne	Nuglade	Unique
Compact	Princeton 105	

2. The following Kentucky bluegrass cultivars are suitable for general use, and are also noted for tolerance of low maintenance conditions:

Barirus	Haga	Monopoly
Caliber	Livingston	Washington
Eagleton	Merit	
Freedom	Midnight	

B. Tall Fescue - The following turf-type cultivars are suitable for general use:

Alamo E	Bulldawg	Debutante	Good-En	Micro DD	Rebel 3D*	Scorpio	Titan 2
Apache II	Chapel Hill	Dominion	Grande	Millennium	Rebel III*	Shenandoah	Tomahawk*
Avanti*	Chieftain II*	Duke	Guardian	Olympic Gold	Rebel Jr.	Shenandoah II	Trailblazer II*
Axiom	Chinook	Duster*	Heritage	Oncue	Rebel Sentry	Southern Choice*	Twilight II
Bandana	Cochise II	Eldorado*	Houndog 5	Pixie	Red Coat	SR 8200	Virtue*
Barlexus	Comstock	Empress	Jaguar III	Pixie E+	Regiment*	SR 8300	Watchdog
Barrington	Coyote	Falcon II*	Lancer	Plantation	Rembrandt	Stetson	Wolfpack
Bonanza*	Crossfire*	Finelawn Petite*	Leprechaun	Pyramid	Renegade	Tarheel	WPEZE
Bonanza II	Crossfire II	Genesis	Masterpiece	Rebel 2000	Reserve	TF6	Wyatt

Tall fescue cultivar names that are followed by an asterisk (*) have low endophyte levels (20% or lower, based on seed analysis). To avoid livestock health problems due to endophyte toxicity, use low-endophyte cultivars for critical area plantings where livestock may be allowed to graze (e.g., heavy use grass loafing paddocks). Please note that endophyte levels in plantings can vary between varieties, between fields of the same variety, and with the time of year. For areas where livestock will not have access, cultivars with higher endophyte levels are desirable because they tend to be more drought tolerant and more resistant to disease and insect damage.

TABLE 5: Quality of Seed					
Species	Minimum Seed Purity (%)	Minimum Seed Germination (%)	Species	Minimum Seed Purity (%)	Minimum Seed Germination (%)
<i>COOL-SEASON GRASSES</i>			<i>WARM-SEASON GRASSES</i>		
Barley	98	85	Bluestem, Big	60	60
Bentgrass, Creeping	95	85	Bluestem, Little	55	60
Bluegrass, Canada	90	80	Deertongue	95	75
Bluegrass, Kentucky	97	80	Indiangrass	60	60
Bluegrass, Rough	96	80	Millet, Foxtail or Pearl	98	80
Fescue, Chewings	97	85	Panicgrass, Coastal	95	70
Fescue, Creeping Red	97	85	Switchgrass	95	75
Fescue, Hard	97	85	<i>LEGUMES/FORBS</i>		
Fescue, Sheep	97	85	Clover, Alsike	99	85
Fescue, Tall	97	85	Clover, Bush	--	--
Meadowgrass, Fowl	--	--	Clover, Red	99	85
Oats	98	85	Clover, White	98	90
Orchardgrass	90	80	Flatpea	98	75
Redtop	92	80	Indigo, Wild	--	--
Rye, Cereal	98	85	Lespedeza, Common	98	80
Ryegrass, Annual or Perennial	97	85	Lespedeza, Korean	98	80
Saltgrass, Alkali	85	80	Pea, Partridge	98	70
Wheat	98	85	Tick-Trefoil, Showy	--	--
Wild Rye, Canada	85	70	Trefoil, Birdsfoot	98	85
Wild Rye, Virginia	--	--	Wildflowers	--	--

TABLE 5 NOTE:

1. All seed shall comply with the Maryland State Seed Law. Seed shall be free of prohibited or restricted noxious weeds, as currently listed by the Maryland Department of Agriculture, Turf and Seed Section.