NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

CRITICAL AREA PLANTING

(Ac.)

CODE 342

DEFINITION

Establishing permanent vegetation on sites that have, or are expected to have, high erosion rates, and on sites that have physical, chemical or biological conditions that prevent the establishment of vegetation with normal practices.

PURPOSE

This practice supports one or more of the following purposes:

- Stabilize stream and channel banks, pond and other shorelines – Resource concern (SOIL EROSION– Excessive bank erosion from streams shorelines or water conveyance channels).
- Stabilize areas with existing or expected high rates of soil erosion by wind or water – Resource concern (SOIL EROSION – Concentrated flow erosion and/or SOIL EROSION - Sheet, rill, & wind erosion and/or SOIL QUALITY DEGRADATION – Concentration of salts or other chemicals).
- Stabilize areas, such as sand dunes and riparian areas – Resource concern (SOIL EROSION – Concentrated flow erosion and/or SOIL EROSION - Sheet, rill, & wind erosion).

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to highly disturbed areas such as:

- urban restoration sites;
- construction areas;
- conservation practice construction sites;
- areas needing stabilization before or after natural disasters such as floods, hurricanes, tornados and wildfires;
- eroded banks of natural channels, banks of newly constructed channels, and lake shorelines;
- other areas degraded by human activities or natural events.

CRITERIA

General Criteria Applicable to All Purposes

Site Preparation. A site investigation shall be conducted to identify any physical, chemical, or biological conditions that could affect the successful establishment of vegetation.

Areas to be planted will be cleared of unwanted materials and smoothed or shaped, if needed, to meet planting and landscaping purposes.

A suitable seedbed shall be prepared for all seeded species. Compacted layers will be ripped and the soil re-firmed prior to seedbed preparation.

As site conditions dictate, when grading slopes, stockpile topsoil to be redistributed over area to be planted

Species Selection. Species selected for seeding or planting shall be suited to local site conditions and intended uses, and be common to the site or location. See Appendices A-E of this standard for specific establishment guidance and plant species specifications for establishment.

Selected species will have the capacity to achieve adequate density and vigor to stabilize the site within an appropriate period.

No plants on the Federal or State

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service State Office or visit the Field Office Technical Guide.

noxious/invasive weed lists shall be used.

Establishment of Vegetation. Seeds will be planted using the method or methods best suited to site and soil conditions.

Sod placement shall be limited to areas that can naturally supply needed moisture or sites that can be irrigated during the establishment period.

Sod will be placed and anchored using techniques to ensure that it remains in place until established.

Species, rates of seeding or planting, minimum quality of planting stock (e.g. pure live seed (PLS) or stem caliper), method of seedbed preparation, and method of establishment shall be specified before application. Only viable, high quality seed or planting stock will be used.

Seeding or planting shall be done at a time and in a manner that best ensures establishment and growth of the selected species

Planting shall be done during approved times for the species to be used.

Apply soil amendments (e.g. lime, fertilizer, compost) according to the requirements in the local Field Office Technical Guide.

Plantings shall be mulched as necessary to ensure establishment. Use the NC NRCS Mulching (Code 484) conservation practice standard to develop mulching specifications. Other disturbed areas shall be mulched as necessary to prevent erosion.

Additional Criteria to Stabilize Stream and Channel Banks, Pond and other Shorelines

Bank and Channel Slopes. Channel side slopes shall be shaped so that they are stable and allow establishment and maintenance of desired vegetation.

A combination of vegetative and structural measures may be necessary on slopes steeper than 2:1 to ensure adequate stability.

Species Selection. Plant material used for this purpose shall:

- be adapted to the hydrologic zone (see Fig. 1) into which they will be planted.
- be adapted and proven in the regions in which they will be used.
- be compatible with existing vegetation in the area
- protect the channel banks but not restrict channel capacity.

Establishment of Vegetation. The species used, planting rates, spacing, and methods and dates of planting shall be based on local planting guides or technical notes.

Identify and protect desirable existing vegetation during practice installation.

Until vegetation is acceptably established, do not mow within 15 feet of the stream bank in order to not inhibit or prevent establishment of desired species. After establishment, maintenance within vegetative establishment zones should only consist of monitoring invasive species, with control measures taken where invasives interfere with the conservation objective of establishment species.

A combination of vegetative and structural practices using living and inert material shall be used when flow velocities, soils, and bank stability preclude stabilization by vegetative establishment alone.

If the existing vegetation on a site will compete with species to be established vegetatively (e.g. bare-root, containerized, ball-and-burlap, potted), it will be controlled in a manner that ensures the successful establishment of the planted species.

Streambank stabilization plantings shall be in accordance with the NRCS Engineering Field Handbook Part 650, Chapter 16 (Streambank and Shoreline Protection) and Chapter 18 (Soil Bioengineering for Upland Slope Protection & Erosion Reduction).

Site Protection and Access Control. Restrict access to planted areas until fully established.

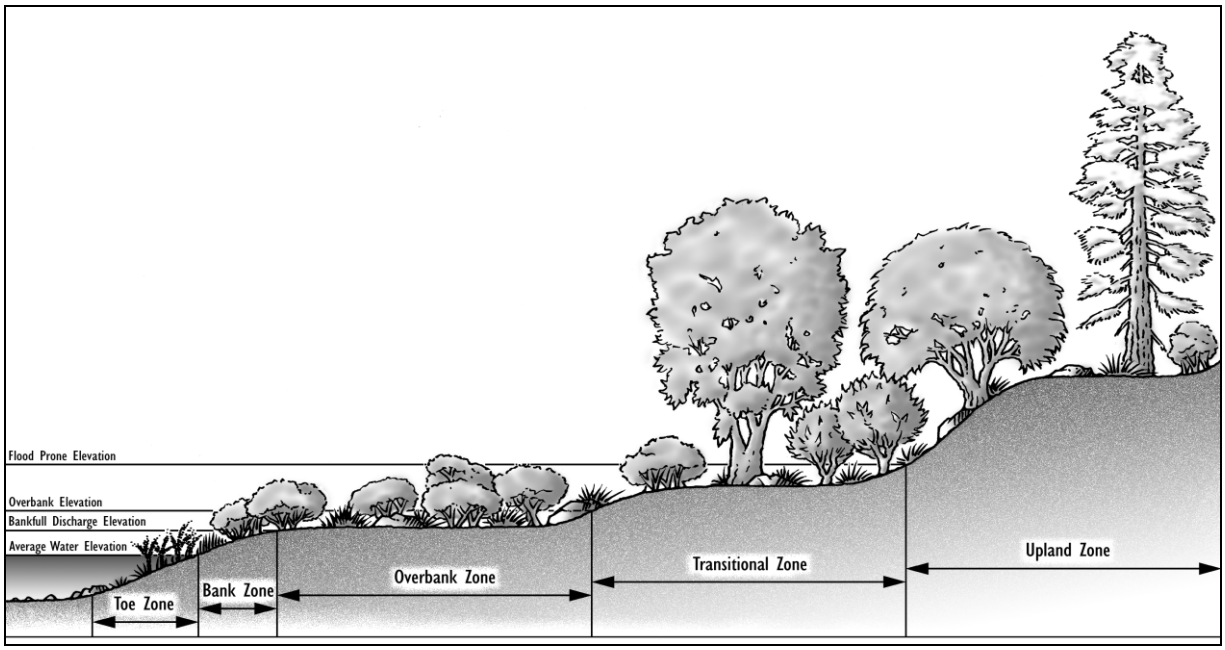

Figure 1. Location of hydrologic zones along a channel or shoreline.

Definitions and descriptions of hydrologic zones used for channels and shorelines:

Bankfull Discharge Elevation - In natural streams, it is the elevation at which water fills the channel without overflowing onto the flood plain.

Bank Zone - The area above the Toe Zone located between the average water level and the bankfull discharge elevation. Vegetation may be herbaceous or woody, and is characterized by flexible stems and rhizomatous root systems.

Overbank Zone - The area located above the bankfull discharge elevation continuing upslope to an elevation equal to two thirds of the flood prone depth. Vegetation is generally small to medium shrub species.

Toe Zone - The portion of the bank that is between the average water level and the bottom of the channel, at the toe of the bank. Vegetation is generally herbaceous emergent aquatic species, tolerant of long periods of inundation.

Transitional Zone - The area located between the overbank zone, and the flood prone width elevation. Vegetation is usually larger shrub and tree species.

Upland Zone – The area above the Transitional Zone; this area is seldom if ever saturated.

Note: some channels or shorelines have fewer than four hydrologic zones because of differences in soils, topography, entrenchment and/or moisture regime.

Additional Criteria to Restore Coastal Areas, such as Sand Dunes and Riparian Areas

Plants for sand dunes and coastal sites must be able to survive being buried by blowing sand, sand blasting, salt spray, salt water flooding, drought, heat, and low nutrient supply.

Sand trapping devices such as sand fences or brush matting shall be included in the re-vegetation/stabilization plans where applicable.

CONSIDERATIONS

Species or mixes that are adapted to the site and have multiple benefits should be considered. Native species may be used when appropriate for the site.

To benefit pollinators and other wildlife, flowering shrubs and wildflowers with resilient root systems and good soil holding capacity also should be considered for incorporation as a small percentage of a larger grass-dominated planting. Where appropriate consider a diverse mixture of forbs to support pollinator habitat.

Avoid species that may harbor pests. Species diversity should be considered to avoid loss of function due to species-specific pests.

Planning and installation of other NC NRCS conservation practices such as Diversion (code 362), Fence (code 382), Obstruction Removal (code 500), Subsurface Drain (code 606), and Underground Outlet (code 620) may be necessary to prepare the area or ensure vegetative establishment.

Areas of vegetation established with this practice can create habitat for various type of wildlife. Maintenance activities, such as mowing or spraying, can have detrimental effects on certain species. Perform management activities at the times and in a manner that causes the least disruption to wildlife.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for each field or management unit according to the criteria and operation and maintenance sections of this standard. Record practice specifications using approved Implementation Requirement document.

The following elements shall be addressed in the plan, as applicable, to meet the intended purpose.

- Site preparation
- Topsoil requirements
- Fertilizer application
- Seedbed/planting area preparation
- Methods of seeding/planting
- Time of seeding/planting
- Selection of species
- Seed/plant source
- Seed analysis
- Seeding rate/plant spacing
- Mulching
- Supplemental water needed for establishment
- Protection of plantings
- Describe successful establishment (e.g. minimum percent ground/canopy cover, percent survival, stand density.

OPERATION AND MAINTENANCE

Use of the area shall be managed as long as necessary to ensure the site remains stable.

Plantings shall be protected from pests (e.g. weeds, insects, diseases, livestock, or wildlife) as necessary to ensure long-term survival.

Inspections, reseeding or replanting, and fertilization may be needed to ensure that this practice functions as intended throughout its expected life. Observation of establishment progress and success should be performed at regular intervals until the practice has met the criteria for successful establishment and implementation.

All areas to be grazed will follow a grazing plan that meets the criteria in the local Field Office Technical Guide.

Grazing will be permanently excluded on high hazard sites, such as cut banks, areas of seepage, or other potential unstable areas.

REFERENCES

Federal Interagency Stream Restoration Working Group. 1998. Stream corridor restoration: principles, processes, and practices. National Engineering Handbook, Part 653.

USDA-NRCS. 2007. National Engineering Handbook, Part 654. Stream restoration guide.

USDA-NRCS. 2010. The PLANTS Database (http://plants.usda.gov, checked September 2010). National Plant Data Center.

342-A Sod Specification Guide

I. Use on sites where more rapid perennial vegetative establishment is needed than can be provided via seeding OR where a high quality turf is desired.

II. Limitations

A. Sod may be placed nearly any time of the year as long as moisture requirements are met and the ground is not frozen. Sod cannot be expected to provide erosion control and prevent soil slippage on a slope that is not stable because of its structure, water movement or excessive gradient.

B. Due to difficulty of successful maintenance on slopes steeper than 3:1, sod establishment is not recommended on these sites. Instead, seed and mulch establishment is preferred. Where slopes must be steeper than 2:1, consider adding retaining walls to break slope length.

III. Sod Specifications

A. Nursery grown permanent sod is preferred over native or pasture sod as vegetative source with high degree of reliability for establishment.

B. Sod should be free of weeds and undesirable coarse weedy grasses.

C. Sod should be of uniform thickness with a ½ to 1-1/2 inch layer to soil (excluding top growth) depending on species and season harvested.

D. Sod should have a compact root mat to assure mechanical strength and to assure early and firm anchoring to soil surface.

E. Only moist, fresh sod shall be used. The area from which sod is to be obtained should be mowed to a height of not more than 2 inches and raked free of grass clippings and debris.

F. Sod should be lifted, delivered, and installed within a period of 7 to 36 hours depending upon season and temperatures. It shall not be harvested when excessively dry or wet conditions may adversely affect its survival.

G. Sod should be cut into rectangular sections of sizes convenient for handling without breaking or loss of soil.

H. If cool season perennials are used, a sod of KY-31 and Bluegrass is preferred over a straight Bluegrass sod for critical slopes, droughty or shaded sites.

I. On hot, droughty areas and outlet channels, low-growing Bermudagrass may be preferable to cool season grasses. They should be installed during spring and summer months.

IV. Site Preparation

A. Grade as needed and feasible to permit the use of conventional equipment for liming, fertilizing, and soil preparation.

B. Excessive water runoff must be controlled by well planned and installed needed erosion control practices, such as ditches, storm sewers, berms, diversions, sodded waterways, and desilting basins.

C. Resoil areas where excavation was made into clay material.

V. Soil Preparation

A. Apply 45 to 75 pounds per 1,000 square feet of pulverized dolomitic limestone and 12 to 25 pounds per 1,000 square feet of 10-10-10 fertilizer, or its equivalent. If soils are reasonably uniform, lime and fertilize according to soil test. Lime and fertilizer shall be spread uniformly over the area to be planted.

B. Harrow or disk lime and fertilizer into the soil to a depth of 3-4 inches. Continue tillage until a

reasonably uniform, fine, seedbed condition has been attained. Hand work may be necessary on odd corners or critical slopes. On sloping land, the final harrowing or disking operation should be on the contour where feasible. Any irregularities in the surface resulting from fertilizing, liming or tilling should be leveled prior to sodding.

C. Prior to sodding, clear the surface of all trash, debris, stones, roots, wire, stakes, and other objects that would interfere with planting or maintenance operations. If needed, firm the seedbed with a cultipacker or other tool.

VI. Sod Placement

A. Soil Sodding

1. Sod strips should be laid across slope, never up and down the slope, starting at the bottom of the slope and working up. On steep slopes, the use of ladders will facilitate the work and prevent damage to the sod. During periods of high temperature, lightly irrigate the soil immediately prior to laying the sod.
2. Place sod strips with snug even joints. Open spaces invite erosion. Stagger joints. All joints should be butted tight in order to prevent voids which would cause air drying of the roots.
3. Roll or tamp sod immediately following placement to insure solid contact of root mat and soil surface. Care should be taken to prevent the installed sod from being torn or displaced.
4. On sloping sites and outlet channels, secure sod to surface soil with wood pegs, wire staples, or split shingles (8 to 10 inches long by ¾ inch wide).
5. Surface water cannot always be diverted from flowing over the face of the slope, but a capping strip of heavy jute or plastic netting, properly secured, along the crown of the slope will provide extra protection against lifting and undercutting of sod. This same technique can be used to fortify sod in water carrying channels and other critical areas. Use wire staples only to anchor jute or plastic netting in channel work.
6. Immediately following anchoring, sod should be watered until moisture penetrates the soil layer beneath sod to encourage quick root growth. Irrigate as needed to prevent desiccation during the first growing season.

B. Spot Sodding

1. Each sod spot should be a minimum of 4 inches in diameter or square and spaced a maximum of 18 inches apart within the row. Sod spots within a row should be placed alternately and not directly opposite sod spots in adjacent rows. Sod pieces shall be even with the surface of the adjoining ground.

C. Strip Sodding

1. Sod strips should be continuous. Areas to be strip sodded should be fertilized, prepared and smoothed like solid sodding.

VII. Maintenance

A. If soils are fairly uniform, lime and fertilize according to soil test. Otherwise:

B. Apply 60 pounds of pulverized dolomitic limestone per 1,000 square feet during late fall or winter every three to four years.

C. Topdress Bluegrass and Tall Fescue sods in early fall with a turf fertilizer such as 10-4-6 or 10-10-10. Additional fertilization in early spring with nitrogen or a complete fertilizer is usually needed to maintain vigorous healthy growing grass. Rates per application will range from 10 to 25 pounds per 1,000 square feet, depending upon the site. To reduce incidence of leaf diseases, do not use nitrogen on Fescue or Bluegrass from mid-April to mid-August.

342-B Perennial Grasses and/or Legumes Specification Guide

I. Site Preparation

A. Grading or clearing of the areas should be done in such a way as to leave the soil in the best possible condition for seeding. This includes leaving as much topsoil as possible or replacing where needed to modify the condition.

B. Where feasible, grade and shape slopes to a 3:1 ratio slope or flatter to permit the use of conventional equipment for seedbed preparation, seeding, mulch application, and anchoring and maintenance operations.

C. Grading and shaping is desirable, but not necessary when seeding is done by other than conventional means, such as with hydraulic equipment or by hand.

D. No seedbed preparation is necessary on most soil and site conditions where seeding is done immediately after excavation or spoil spreading is completed. Where this type of seeding is done, the excavation work should be completed during the optimum seeding date for the desired plant or mixture of plants.

E. Where adverse soil conditions require modification, apply at least 3 to 4 inches of topsoil or similar soil material. The use of topsoil should be considered where the soil texture at the site is sandy clay, silty clay, or clay. Ripping prior to the addition of new material is usually needed.

F. Remove all woody material, loose rock, and other obstructions that may interfere with planned seeding and maintenance operations.

II. Lime and Fertilizer

A. Where amendments can be incorporated and soils are reasonably uniform, lime and fertilize according to soil test. In the absence of a soil test, apply 2 tons finely ground dolomitic limestone per acre (92 pounds per 1,000 square feet) and 500 to 800 pounds of 20% superphosphate or equivalent per acre (12 to 18 pounds per 1,000 square feet). Additional amounts and analysis of fertilizers to use at seeding are:

B. Grasses alone – 700 to 1,000 pounds per acre of 10-10-10 equivalent (18-23 pounds per 1,000 square feet).

C. Grasses and legumes or legumes alone – 70 to 1,000 pounds per acre to 5-10-10 or equivalent (18-23 pounds per 1,000 square feet).

D. An additional application of 30-50 pounds of nitrogen per acre plus other nutrients is usually needed within three (3) to twelve (12) months after planting. Application should be based on soil test and timed to growing cycle of the species being established. Use low N rate if a legume is present.

E. Where site conditions prevent soil incorporation of lime and fertilizer, soil samples should be taken prior to applying soil amendments. Indicate on the soil test information sheet that the lime and fertilizer will be applied by means of hydroseeding equipment or cannot be incorporated in order to obtain proper recommendations.

F. If soil test results are not available at seeding, the first application of lime and fertilizer will be one (1) ton of finely ground dolomitic limestone, 400 pounds of 10-10-10 fertilizer per acre or equivalent. This rate also applies when hydroseeding.

G. After seeding, the second application of lime and fertilizer will be the balance of the lime up to one (1) ton and the balance of any P or K required by the soil test. The lime, P, and K plus 30-50 pounds of nitrogen should be timed as in 1C above.

H. If a soil sample is not to be taken, apply soil amendments as in 2A above, plus an identical amount at the beginning of the first growing season after seeding.

I. Any additional applications of soil amendments will be in accordance with paragraph H.

III. Seedbed Preparation

A. Work lime and fertilizer into the soil where conventional equipment can be used. Use disk or similar equipment to prepare to depth of 3-4 inches. Use ripper if necessary.

B. Lime and fertilizer may be applied with seed mixture when a hydroseeder is used and where mulch will be applied. Seedbed preparation may not be necessary where hydroseeding equipment is used.

C. Slopes that are too steep for conventional equipment (2:1 or steeper) should be seeded with hydroseeding equipment.

D. Where hydroseeding equipment is not available for use on steep slopes, scarify the soil surface with a chain harrow, pick chain, grader blades with chisels, hand tools, or other equipment that will put the soil or make trenches approximately 1-2 inches deep, 6-12 inches apart across the slope in which the seed can lodge and germinate.

IV. Establishment with Seeds

A. From the attached table, select the plant or mixture best suited for the site based on soil and moisture conditions, slope, aspect and elevation.

B. Specifications shall state the minimum seed purity percentage and minimum germination percentage that is acceptable for the species being used.

C. Seed containing prohibited to restricted noxious weeds may not be accepted.

D. All seed shall be labeled to show that it meets the requirements of North Carolina Seed Law.

E. All seed used shall have been tested within the six (6) months immediately preceding the date of seeding.

F. The inoculant for treating legume seed shall be prepared specifically for the species. Inoculants shall not be used later than the date indicated on the container. Twice the supplier's recommended rate of inoculant will be used on dry seedlings; four times the recommended rate if hyroseeded.

G. Where hydraulic seeding equipment is used, seed, fertilizer, and wood-fiber mulch materials are mixed into slurry with water. <u>The inoculant is added to the tank immediately prior to seeding</u>. Care should be used to spread the mixture evenly and within 30 minutes after the mixture is made. For best results, keep the mixture well agitated and <u>apply when soil is moist</u>.

H. Where conventional equipment is used, seed shall be applied uniformly with cultipacker-seeders, drills, rotary seeders, or other mechanical seeders. Any equipment that will apply seed uniformly is acceptable. Seedings may be done by hand on areas where it is not practical and feasible to use equipment. When seeding by hand, sow one-half in one direction and the other half at right angles to the first. Cover seed to a depth of approximately ½ to 1 inch, depending on the size of the seed.

I. When cultipacker-seeder is not used, firm seed-bed and cover seed with suitable equipment, before or after mulching, depending upon type mulch used and method of anchoring.

J. On dikes, ditch banks, etc., seeding may be made by broadcasting the seed on spoil areas and side slopes immediately following excavation or spoil spreading.

V. Establishment with Vegetated Material

A. Select a suitable plant from the attached table.

B. Areas that will be subject to traffic and rountine mowing in residential, commercial, or industrial developments may be established by using grass stolons (sprigs or runners). Precaution should be used to make certain only fresh, moist planting material is used.

C. Planting Methods for Bermudagrass

1. Prepare a smooth seedbed, shred stolons, broadcast and disk into the top 1-2 inches of soil, and firm the soil. Plantings may be made with a transplanter or hand planting tools.
2. Open shallow furrow 24-30 inches apart, drop clumps of stolons in furrow and cover 1-2 inches deep, and smooth and firm the soil.
3. Fill burlap bags with Bermudagrass roots and soil. Place bags 10-15 feet apart in small gullies or scouring ditches.
4. Spread 3-4 inches of soil filled with Bermudagrass roots and firm the soil.

D. Crown vetch plants may be planted in furrows, excavated holes, or with spade, dibble or similar hand tools. When planting in excavated holes, dig holes large enough to allow roots to spread out to full length. When planting in “pot” holes or furrows, place about a level tablespoon of fertilizer per plant in the bottom of planting. Set plants slightly deeper than they grew in the nursery and firm the soil. If vegetative materials are not dormant, water during planting operations.

VI. Mulching

A. Mulch is essential on all sites, especially steep, erosive sites where plant establishment may be expected to be different. On some moderately fertile to fertile sites planted at optimum time for the species, mulch may be omitted. It is the responsibility of the conservationist to determine the need for mulching based on the hazards involved, consider materials available, and determine specifications for the job.

B. Mulching Materials

1. Dry, unchopped, unweathered small grain straw or hay free of seeds of competing plants – Spread at the rate of 1-2 tons per acre depending upon the site and season. Evenly spread mulch over the area by hand or mechanical equipment. Apply mulch uniformly so that about 25% of the ground surface is visible.
2. Broomsedge hay mulch – Spread where it is desirable to establish this native plant.
3. Shredded or hammermilled hardwood bark – Spread at a rate of 35 cubic yards per acre. On slopes of 2:1 or steeper, increase rate to 40 cubic yards per acre. Do not apply asphalt material to tack the hardwood bark.
4. Local materials such as burlap and pine boughs – Cover entire area; secure in place if flowing water is involved. Do not use green pine branches where pine trees are to be planted because of possible insect or disease injury to plantings.
5. Barnyard manure and bedding – Apply uniformly so that about 25% of the ground surface is visible. Due to water quality concerns, do not apply manure materials within 50 feet of surface waters. Use alternative mulching materials.
6. Jute matting is a coarse, open-mesh material woven of heavy jute twine. It may be used in place of mulch or sod and has the strength to withstand waterflow. It is an accepted practice to sow half the seed before placing the matting. Sow the remaining half after the matting is laid. See the manufacture’s specifications for installing.
7. Wood fiber (excelsior) is available as mulch material to be blown on after seeding or as a matting to be stapled on steep slopes, waterways, etc. See the manufacture’s specifications for installing.
8. Wood cellulose fiber mulch is mixed with seed, fertilizer, and water. The resulting slurry is sprayed on with hydraulic seeding equipment. Use at the rate of 500 pounds per acre where straw or hay is to be applied. Use at the rate of 1,000 to 1,500 pounds per acre without other mulching materials. Applied in slurry, wood cellulose fiber mulch is self-anchoring.
9. Other commercial products, such as fiberglass and various kinds of nettings, are available. Manufacturer’s directions should be followed for applying and securing in place.

VII. Mulch Anchoring Methods

Anchor mulch immediately after placement to minimize loss by wind and water. Consider size of area, type of site, and cost, and select one of the following:

A. Mulch anchoring tool with a series of flat-notched disks that punch and anchor mulch material into the soil. A regular farm disk weighted and set nearly straight may substitute but will not do a job comparable to the mulch anchoring tool. The disk should not be sharp enough to cut up the mulch.

   The soil should be moist, free of stones or roots and loose enough to permit penetration to a depth of 3 inches. Operate as near as practical to the contour.

B. Mulch nettings – Staple light-weight paper, jute, cotton, plastic, or wire nettings to the soil surface according to manufacturer's specifications. These nettings are usually in rolls 3 to 4 feet wide and up to 300 feet long.

C. Peg and twine – Drive 8 to 10 inch wooden pegs to within 2 to 3 inches of the soil surface every 4 feet in all directions. Stakes may be driven before or after applying mulch. Secure mulch to soil surface by stretching twine between pegs in a criss-cross within a square pattern. Secure twine around each peg with two or more round turns. Poles and stakes may also be used to secure brush in place.

D. Slit – with a square pointed spade, cut mulch into the surface soil in contour rows 18 inches apart.

E. Asphalt mulch tie-down – Asphalt sprayed uniformly on the mulch as it is ejected from the blower is more effective than applied as a separate operation. Apply so area has uniform appearance. Rates of application will vary with conditions. The higher the grade number assigned each type of asphalt the higher the percentage of asphalt residue. Asphalt should not be used in freezing weather. Asphalt-based materials should not be applied within 50 feet of surface waters.

F. Emulsified Asphalt – Apply uniformly 0.04 to 0.08 gallons per square yard or 200 to 400 gallons per acre of <u>rapid setting</u> (RS-1, CRS-1, RS-2, CMS-2); <u>medium setting</u> (MS-1, MS-2, or CMS-2); <u>slow setting</u> (SS-1 or CSS-1).

   1. Rapid setting (RS or CRS) is formulated for curing in less than 24 hours even during periods of high humidity. Best for spring and fall.
   2. Medium setting (MS or CMS) is formulated for curing within 24 to 48 hours.
   3. Slow setting (SS or CSS) is formulated for use during hot, dry weather with 48 hours or more curing time.

   <u>Note</u> – In areas of playing children or pedestrian traffic, asphalt application could cause problems of "tracking in" on rugs; damage shoes, clothing, etc. Use ¼ to ½ bushel of rye or 15 pounds of millet per acre broadcast ahead of mulch application.

G. Mulch can be anchored with rye for fall plantings or millet for summer plantings. Use types RS or CRS to minimize problem.

VIII. Maintenance

A. Control of Competition - Competitive weed growth during the period of establishment should be controlled by mowing and/or with herbicides. When chemicals are used, follow current North Carolina Agricultural Chemicals Manual recommendations and adhere strictly to instructions on label.

B. Irrigation - If soil moisture is deficient, supply new planting with adequate water (3-4" penetration) for plant growth at 10-day intervals, if needed, until they are established. This is most important on late season plantings, in abnormally dry or hot seasons.

C. Repairs - Inspect all areas for planting failures and make necessary repairs, replacements, and

reseeding within the planting season if possible.

D. Lime and Fertilizer - Lime and fertilizer should be applied under a regular program based on soil fertility tests and on the use and general appearance of the vegetative cover. In the absence of a soil test, lime and fertilize as shown below:

1. Lime - Apply 1 to 2 tons dolomitic limestone per acre, or 43-92 pounds per 1,000 square feet during late fall or winter every 4-5 years and fertilize annually or as needed to maintain healthy, vigorous growing plants.

2. Fertilizer:

   a. Pure stands of Tall Fescue, and mixtures of Tall Fescue-Red Fescue and similar cool-season plants - Apply 400-500 pounds per acre or 9-12 pounds per 1,000 square feet of 10-10-10, or its equivalent, in early fall. Additional fertilization with nitrogen or a complete fertilizer is usually needed in early spring. Do not use nitrogen on Fescue or Bluegrass from mid-April to mid-summer.

   b. Pure stands of Bermuda, Bahia, Lovegrass and similar warm season grasses - Apply 400-500 pounds per acre or 9-12 pounds per 1,000 square feet of 10-10-10 fertilizer or equivalent when the plants start to green up in the spring. Topdress with 60-90 pounds of nitrogen per acre or 1-2 pounds per 1,000 square feet, during the growing season. When the higher rate is used, apply in split applications.

   c. Pure stands of Crownvetch and similar legumes - Fertilize in early spring with 400-500 pounds of 0-10-20 (9-12 pounds per 1,000 square feet) or equivalent per acre.

   d. Mixtures of Fescue, Lovegrass, or Bermudagrass - Fertilize in late winter or early spring with 400-500 pounds per acre (9-12 pounds per 1,000 square feet) of 5-10-10 or equivalent. In Fescue Sericea Lespedeza mixture, apply in the fall if the Sericea Lespedeza is developing better than the Fescue.

   e. Fescue-White Clover, Bluegrass-White Clover and similar mixtures - Apply 400-500 pounds per acre (9-12 pounds per 1,000 square feet) of 0-20-20 or equivalent in early fall. An additional application of nitrogen or complete fertilizer may be needed in the spring to keep plants lush and in balance. Where grass is crowding out the clover, reduce or eliminate spring application of nitrogen.

E. Mowing

1. Where moving is deemed necessary to meet client objectives, mow grasses at least annually to control weeds and undesirable woody vegetation. Do not mow within 15 feet of stream channels.

   a. Bluegrass should be mowed not closer than 2 inches.

   b. Tall Fescue not closer than 3-4 inches.

   c. Bahia and low-growing Bermudagrass may be mowed about 2 inches high.

2. Care should be taken not to damage the vegetation mechanically through use of improper mowing equipment or by attempting to mow with heavy equipment or by attempting to mow with heavy equipment on steep slopes when the vegetation is lush and slippery, or when the ground is soft enough to be rutted by mower or tractor wheels.

3. Where mowing fails to control weeds satisfactorily, apply chemicals in accordance with current North Carolina Agricultural Chemicals Manual weed control recommendations and adhere strictly to instructions on label.

Table 1. Perennial Grass & Legume Seed Specifications for Critical Areas

PLANTS AND MIXTURES	MINIMUM PLANTING RATES/ACRE and PLANTING DEPTH inches B = broadcast D = drill R = in a row (≤30") PLS = pure live seed	PLANTING DATES 1. Mountains above 2500 feet above sea level 2. Piedmont and organic soils and soils with an Histic epipedon in the Tidewater Area. 3. Southern Coastal Plain, Atlantic Coast Flatwoods, Tidewater Area and Carolina & Georgia Sand Hills.	NOTES **Recommended planting dates and ranges revised March 2013. Additional plants and mixtures, including native grasses, have been identified as effective for stabilization on critically eroding sites. Table 1 is not meant to be a complete list. Please contact NRCS State Plant Materials coordinator for more information or with questions on other specific plants or mixtures.**
'Pensacola' Bahiagrass (scarified seed)	D40-50 lbs. B50-60 lbs. ¼-½ inch	1. Not recommended. 2. Not recommended. 3. Feb 15—March 15 best; Feb 1—March 31 possible	Bahiagrass best adapted south and east of I-85 in North Carolina. Do not use where seed head appearance warrants mowing.
Coastal Panicgrass	D8-10 lbs. B10-12 lbs.	1. Not recommended 2. Not recommended 3. Feb 15-Mar 31 best; Feb 1-April 30 possible	
Common or Hybrid Bermudagrass (hull removed or scarified)	D5-7 lbs. B6-8 lbs. ¼-½ inch	1. Not recommended 2. April 15—May 15 best; April 1—June 15 possible 3. April 1—May 15 best; April 1—June 7 possible	Best under 2,000' elevation and south slopes, well-drained sunny sites, withstands traffic. Use Piedmont establishment dates when planting on any suitable sites above 2000'.
Crown vetch	D10-15 lbs. B15-20 lbs. ¼-½ inch	1. July 25—Aug 10 best; July 15—Aug 30 possible 2. Not recommended 3. Not recommended	Best in mountains, and upper Piedmont on north facing slopes 9% or steeper. Spring transplanting preferred. Requires a pH of 6+ and maintenance of lime, P & K every 3-4 years. Slow to establish with seeds. Good plant on slopes that will not be mown.
Flatpea 'Lathco'	D20-30 lbs. 1 ½ inches	1. July 25—Aug 10 best; July 15—Aug 30 possible 2. Not recommended 3. Not recommended	Same as Crownvetch, except requires pH increase when pH drops below 5; adapted to sandy soils; when established, suppresses woody growth; more shade tolerant than Crownvetch; slow to establish, plant with 10 to 15 lbs/ac of Orchardgrass, or Timothy for non enduring quicker cover. Tall Fescue is long lived but may be substituted.
Prairie Cordgrass	D7-8 lbs. or B8-9 lbs. PLS/ac 1/2-3/4 inch ≈11,000 plants/ac-plants available commercially	1. Dec 1—April 30 2. Nov 15—April 15 3. Nov 1—March 31	Useful in dry detention structures or channels that retain water no more than 30 days during the growing season.
Tall Fescue	30-40 lbs.	1. July 25—Aug 10; March 20—April 20 2. Aug 25—Sept 15; 3. Sept 1—Sept 30	Not well suited to infertile, droughty, sandy soils. Requires good maintenance. Seeding date in mountains varies with elevation and aspect.
Tall Fescue and White Clover	30-50 lbs.	1. July 25—Aug 10; March 20—April 20 2. Aug 25—Sept 15;	Can be used where regular mowing is desired and high level of maintenance will be provided.

	3-4 lbs.	3. Sept 1—Sept 30	

PLANTS AND MIXTURES	MINIMUM PLANTING RATES/ACRE and PLANTING DEPTH inches B = broadcast D = drill R = in a row (≤30") PLS = pure live seed	PLANTING DATES 1. Mountains above 2500 feet above sea level (below 2501 feet above sea level extend Fall date by 20 days and seed up to 15 day earlier in the Spring). 2. Piedmont and organic soils and soils with an Histic epipedon in the Tidewater Area. 3. Southern Coastal Plain, Atlantic Coast Flatwoods, Tidewater Area and Carolina & Georgia Sand Hills.	NOTES
Tall Fescue and Bluegrass	20-30 lbs. 10-15 lbs.	1. July 15—Aug 10 best; July 15—Aug 25 possible 2. Not recommended 3. Not recommended	Limited to fertile well-drained soils in Northern Piedmont and Mountains.
Tall Fescue and Rye grass	40-60 lbs. 25-30 lbs.	1. Aug 1—Aug 10 2. Aug 25—Sept 15 3. Sept 5—Sept 30	Use only when necessary to complete a job. Mulching will be necessary to provide erosion control. Keep annuals cut back to 10" – 12".
Sericea Lespedeza (scarified and unscarified)	B: 30-40 lbs. D: 20-30 lbs.	1. March 15-April 15 best; March 1—April 30 possible 2. March 1-March 20 best; Feb 15—April 30 possible 3. March 1-March 20 best; Feb 15—April 30 possible	Sericea is recognized as a potentially invasive species. Its specification should only occur where the plant's potential spread and persistence in the environment is determined to be an acceptable risk
Weeping Lovegrass	4-6 lbs	1. May 1—June 15 best; Apr 15—July 31 possible 2. April 15—June 1 best; April 1—July 15 possible 3. April 1—May 15 best; March 15—June 30 possible	Gives quick summer cover, well adapted to droughty sites. Over time its clumping growth habit promotes erosion from overland flow. Use as a temporary erosion control plant unless planted in mixtures with Sericea Lespedeza.

342-C Short-Term Seeding Specification Guide

When temporary vegetation is desirable to minimize erosion and pollution and permanent vegetation cannot be established due to seasons of the year, and where a temporary seeding is needed to control erosion and water pollution prior to the establishment of finished grade or perennial vegetation. The temporary measures should be coordinated with the permanent erosion control measures planned, to assure economical and effective control.

I. Site Preparation

A. Excessive water run-off must be controlled by planned and installed needed erosion control practices, such as closed drains, ditches, dikes, diversions, contour ripping, sediment basins or other erosion control methods.

B. Grade where practical and feasible to permit the use of conventional equipment for seedbed preparation, seeding, mulch application and anchoring.

II. Materials

A. Lime and fertilizer treatment specified will be affected by site conditions, length of time short-term seedlings are expected to be on the site, and the planned treatment to follow.

B. If soils are reasonably uniform, lime and fertilize according to soil test recommendations. Otherwise, apply 100 pounds of ground agricultural limestone or equivalent per 1,000 sq. ft. or 2 tons per acre and apply 12 to 16 pounds of 10-10-10 or similar fertilizer per 1,000 sq. ft., or 500-700 pounds per acre. On some sites, seeding may be done without liming or fertilizing. Nitrogen top dressing may be applied after grass is up if needed for vigorous growth. Lime and fertilizer shall be spread uniformly over the area to be planted.

C. Where a permanent seeding is to follow the temporary cover, optimum land preparation should be done. When further grading is to be done before the permanent seeding or where site conditions are favorable, mineral preparation may be satisfactory for establishing temporary cover. For optimum results, work lime and fertilizer into the soil to a depth of 3-4 inches using disks, chisels, rotary tillage equipment or other suitable equipment. On sloping land, the final tillage operation should be on the general contour. The adequacy of minimum preparation is dependent upon site conditions. In general, if the soil surface is such that the seeds of plants with high seedling vigor can be placed so as to remain in contact with moist soil, no preparation is required.

III. Seeding

A. Select from the following table a quick growing grass with high seedling vigor that is suited to the area, to the time of planting, and that will provide a temporary cover which will not interfere with the plants to be sown later for permanent cover. Seedlings made in December and January will not provide effective short-term cover. Mulch without seeding should be considered for this period.

B. Apply seed uniformly by hand, cyclone seeder, drill, cultipacker seeder or hydraulically (slurry may include fertilizer, seed and cellulose fiber mulch). For quickest and best results, seed should be covered from ½ to 1 inch deep except when hydroseeder is used.

C. When a hydroseeder or cultipacker type seeder is <u>not</u> used, the seedbed should be firmed following seeding using such equipment as a cultipacker, roller, or light drag; or following dry mulch application, with the mulch anchoring tool, disk harrow set straight, or stalk cutter. On sloping land, seeding operation should be performed across the slope.

Late Winter-Spring	Per 1,000 Sq. Ft.	Per Acre
Buckwheat	2 lbs.	80 lbs.
Oats	2 lbs.	3 bu.
Rye	3 lbs.	2-3 bu.
Ryegrass	1 lb.	30-40 lbs.
Oats and	1 lb.	1 ½ bu.
Ryegrass	1/2 lb.	20 lbs.
Oats and	1 lb.	1 ½ bu.
Korean Lespedeza	1/2 lb.	20 lbs.

Summer	Per 1,000 Sq. Ft.	Per Acre
Sudangrass	1 lb.	34-45 lbs.
Browntop Millet	1 lb.	30-40 lbs.
Weeping Lovegrass	.2 lbs.	4-6 lbs.

Late Summer/Early Winter	Per 1,000 Sq. Ft.	Per Acre
Rye	3 lbs.	2-3 bu.
Ryegrass	1 lb.	30-40 lbs.
Oats (Before Oct. 1)	2 lbs.	3 bu.
Barley (Before Oct. 15)	3 lbs.	2-3 bu.
Wheat (After Oct. 1)	3 lbs.	2-3 bu.
Rye and Ryegrass mixture	1 ½ lbs. Rye + 1/2 lb. Ryegrass	1 bu. Rye + 20 lbs. Ryegrass
Little barley	3 lbs.	75-80 lbs.

NOTE: All seed used in contracts shall have been tested not more than six (6) months prior to date of seeding. The specifications shall state the acceptable percent purity, germination and number of noxious weed seed per pound.

IV. Mulching

Mulching should usually be specified to reduce damage from water run-off and improve moisture conditions for seedlings. Temporary vegetation can in some cases be satisfactorily established without the use of mulch. The use of mulch is a judgment decision based on time of seeding and conditions of individual sites.

V. Mulching Materials

A. Dry unchopped, unweathered small grain straw or hay free of seeds of competing plants – Spread at the rate of 1 to 2 tons per acre, depending upon the site and season. Evenly spread mulch over the area by hand or blower-type spreading equipment. Apply mulch so that about 25% of the ground surface is visible.

B. Local materials such as burlap and pine boughs – Cover entire area; secure in place if flowing water is involved.

C. Barnyard manure and bedding – Apply uniformly so that about 25% of the ground surface is visible. Do not apply within 50 feet of surface waters.

D. Jute matting may be used in the place of mulch or sod and has the strength to withstand waterflow. It is an accepted practice to sow half the seed before placing the matting. Sow the remaining half after the matting is laid. See the manufacturer's specifications for installing.

E. Wood fiber (excelsior) – Available as mulch material to be blown on after seeding or as a matting to be stapled on steep slopes, waterways, etc. See the

maufacturer's specifications for installing.

F. Wood cellulose fiber mulch is mixed with seed, fertilizer, and water. The resulting slurry is sprayed on with hydraulic seeding equipment. Use at the rate of 500 lbs. per acre where straw or hay is to be applied. Use at the rate of 1,000 to 1,500 lbs. per acre without other mulching materials. Applied in a slurry, wood cellulose fiber mulch is self-anchoring.

G. Other commercial products, as fiberglass shredded or hammer milled hardwood bark and various kinds of nettings, are available. Manufacturer's directions should be followed for applying and securing in place.

VI. Mulch Anchoring Methods

Anchor mulch immediately after placement to minimize loss by wind and water. Consider size of area, type of site, and cost and select one of the following:

A. Mulch anchoring tool with a series of flat notched disks that punch and anchor mulch material into the soil. A regular farm disk weighted and set nearly straight may be substituted but will not perform as well as a mulch anchoring tool. The disk should not be sharp enough to cut up the mulch.

B. The soil should be moist, free of stones or roots, and loose enough to permit penetration to a depth of 3 inches. Operate on the contour where practical.

C. Mulch nettings – Staple light weight paper, jute, cotton, plastic, or wire nettings to the soil surface according to manufacturer's specifications. These nettings are usually in rolls 3 to 4 feet wide and up to 300 feet long.

D. Peg and twine – Drive 8 to 10 inch wooden pegs to within 2 to 3 inches of the soil surface every 4 feet in all directions. Stakes may be driven before or after applying mulch. Secure mulch to soil surface by stretching twine between pegs in a criss-cross within a square pattern. Secure twine around each ped with two or more round turns. Poles and stakes may also be used to secure brush in place.

E. Slit – With a square pointed spade, cut mulch into the surface soil in contour rows 18 inches apart.

F. Asphalt mulch tie-down – Asphalt sprayed uniformly on the mulch as it is ejected from the blower is more effective than applied as a separate operation. Apply so area has uniform appearance. Rates of application will vary with conditions. The higher the grade number assigned each type of asphalt, the higher the percentage of asphalt residue. Asphalt should not be used in freezing weather, and should not be applied within 50 feet of surface waters.

G. Emulsified asphalt – Apply uniformly 0.04 to 0.08 gallons per square yard or 200 to 400 gallons per acre of <u>rapid setting</u> (MS-1, MS-2, or CMS-2); <u>slow setting</u> (SS-1 or CSS-1).

1. Rapid setting (RS or CRS) is formulated for curing in less than 24 hours even during periods of high humidity. Best for spring and fall.
2. Medium setting (MS or CMS) is formulated for curing within 24 to 48 hours.
3. Slow setting (SS or CSS) is formulated for use during hot, dry weather with 48 hours or more curing time.

<u>Note</u> – In areas of playing children or pedestrian traffic, asphalt application could cause problems of "tracking in" on rugs, damage shoes, clothing, etc. Use types RS or CRS to minimize problem.

VII. Irrigation (if needed)

A. Water should be applied as soon as the mulch is applied at a rate that does not cause runoff and erosion. If sprinkler irrigation equipment cannot be used and water is applied from a tank truck, use a nozzle that will produce a spray that will not dislodge the mulch. A second application should be made in 10 days, if no rainfall has occurred.

342-D Tree Shrub & Vine Specification Guide

Where a permanent, long-lived vegetative cover other than turf is desired.

Plant Selection

The plants in this group were selected because they have some definite conservation use and in addition, have the ability to grow on certain problem soils and site conditions. (See Table 342-IV-4). It is not a complete list, but rather a collection of the more common plants -- most of which are available at commercial nurseries.

Planting

Early spring. This allows for the maximum root and top development to check erosion and allows the plant to become established before winter.

Soil Preparation

It is expected that the soils at most critical area planting sites will be amended by the addition of topsoil, compost, peat, sawdust, manure or other organic material. Fertilizer will be used for each planting. Lime will also be required unless the soil is known to have a pH of 6 or above or if the plant requires an acid site.

For close spaced mass plantings apply a commercial granular fertilizer, such as 5-10-10 and organic supplement (such as composted cow manure, peat or well rotted sawdust), and work into the soil prior to planting. Fertilizer rate – 3 to 5 lbs. per 100 sq. ft. The amount of organic material needed will depend upon the soil and plant being used. Plants such as Pachysandra require a high rate of organic material, about a 2-inch layer worked into the root zone. Depending on the soil type and steepness of slope, the depth of soil working will vary from 4 to 6 inches.

For mass plantings on steep slopes (3 to 1 or steeper), working up the entire planting area would not be practical and would induce erosion. Instead, work up the soil in contour rows or dig single holes for each plant. Blend the needed lime, fertilizer and organic material with the soil removed from each hole or furrow. Great care must be taken to avoid fertilizer burn. Use it sparingly. Mix it thoroughly with the soil before planting. If the soil on the slope is not suitable for plant growth, it is best to batch blend a planting medium, such as a mixture of 1:1 or 2:1 sandy loam soil and peat, composted cow manure, or well rotted sawdust and 10 lbs. of 5-10-10 and 20 lbs. of lime per cubic yard of soil mix (if manure is used, delete the 5-10-10).

The entire planted slope should be covered with protective mulch, such as shredded hardwood bark, grain or pine straw or other weed free organic material. These are essential to conserve moisture, control erosion and suppress weeds. (Note: It requires about a 6-inch layer of mulch to prevent weed growth).

Where erosion hazard is very high, heavy jute matting stapled to the slope will provide excellent erosion control, as will landscape mats of fiberglass or excelsior.

For spaced plantings of individual vines, shrubs or trees, single holes are dug for each plant. Holes must be at least a third larger than needed to accommodate the root system.

If the soil removed from the hole is moderately suitable for plant growth, the organic material, lime and fertilizer may be blended with it and the mixture used for refilling. If the soil is very poor (such as parent material) mix up a batch of topsoil as described above and use for refilling. The soil around each plant must be thoroughly firmed and left in a saucer-like shape to retain water. The plant must then be watered and mulched. Support tall tree transplants with guy wires.

Maintenance

Some watering, weeding, remulching and feeding may be required for new ground covers or spaced plantings during the period of establishment. Cultivation as such is not recommended as this may encourage erosion and might also cause some root injury. Competing weeds should be pulled or controlled with approved herbicides.

Fertilize the plantings the spring of the second growing season and thereafter as needed using 2 to 3 lbs. of a granulated commercial fertilizer such as 5-10-10 per 100 sq. ft.

PLANT SPECIES	CONS. USE*	ADAPTED FOR SITES**	ADAPTED AREA CP, P, MTS.	GROWTH RAPID MEDIUM SLOW	HEIGHT
A. LOW MAT FORMING EVERGREENS					
Bugleflower *Ajuga reptans*	1	a, f	All	R	4-8”
Lilyturf *Liriope spicata*	1	a, f	All	S	8-12”
Aaron's beard *Hypericum calycinum*	1	a, b, f	CP, P	R	10-12”
Japanese spurge *Pachysandra terminalis*	1, 6	f	All	S-M	6-12”
Moss pink *Phlox sublata*	1	a, b	All	S	6”
Lavender cotton *Santolina chamaecyparissus*	1,9	a, b	All	M	1-2’
Green santolina *Santolina virens*	9	a, b	All	M	10-16”
Wineleaf cinquefoil *Potentilla tridentata*	1	a, b, c	All	S	4-12”
B. HERBACEOUS PLANTS					
Daylily *Hemerocallis sp.*	1, 2, 9	a, b	All	M	16-24”
Crown vetch *Coronilla varia*	1, 2	a, b	P, MTS	M	24”
Iris bearded *Iris sp.*	1	a, b	All	S	1-2’
Flat pea *Lathyrus sylvestrus*	1	a, b	All	S	1-1 1/2’
Beargrass *Yucca filamentosa*	1, 6, 9	a, b	CP	S	
Spanish bayonet *Yucca alinifolia*	1, 6, 9	a, b	CP, P	S	4-10’
C. DECIDUOUS VINES					
Virginia creeper *Parthenocissus quinquefolia*	1, 6, 7, 9	a, b, c, e	CP, P	M	
Peppervine *Ampelopsis arborea*	1, 9	a, b, c, e	All	R	
Muscadine grape *Vitis rotundifolia*	1, 7, 8, 9	a, b, c e, f	All	S	
Trumpet creeper *Campsis radicans*	1	a, b, c, e	CP, P, MTS	R	
Memorial Rose *Rosa wichuraiana*	1, 6	a, b, c, e	All	M	
D. EVERGREEN SHRUBS WITH NEEDLES					
Creeping juniper *Juniperus horizontalis*	1, 6	a, b	All	S	12-16”
Sargent juniper *Juniperus chinensis var. sargenti*	1, 6, 9	a, b	All	S	2-3’
Pfitzer’s juniper *Juniperus chinensis var. pfitzzeriana*	1, 6, 9	a, b	All	S	3-6”
Shore juniper *Juniperus conferta*	1, 6, 9	a, b	All	M	1-2’
E. EVERGREEN SHRUBS-BROADLEAF					
Bigleaf winter creeper *Euonymus fortunei vegetus*	1, 2, 6	a, e, f	All	M	3-4’
Evergreen euonymous *Euonymus japonicus*	3, 4, 6, 9	a, b	CP, P	R	7-10’
Waxmyrtle *Myrica cerifera*	1, 3, 7, 8, 9	a, c, d	CP, P	M	10-30’
Bayberry *Myrica pennsylvanica*	1, 7, 8, 9	a, b, c	All	M	4-7’
Yaupon holly *Ilex vomitoria*	3, 7, 9	a, b, c, d	CP, P	S	10-24’
Inkberry	1	a, d	CP	S	6-9’

Ilex glabra					
Oleander *Nerium oleander*	9	a, b	CP	M	7-15’
Pittosporum *Pittosporum tobira*	3, 6, 9	b	CP	M	6-10’
Wintergreen barberry *Berberis julianae*	1, 4, 5	a, b, f	All	S	4-6’
Firethorn *Pyracantha coccinea*	3, 5, 7, 8	f	CP, P, MTS	M	6-10’
F. DECIDUOUS SHRUBS					
‘Arnold Dwarf’ forsythia *Forsythia arnoldi*	1, 6	a, b	All	R	2-3’
Showy forsythia *Forsythia intermedia spectabilis*	1, 6	a, b	All	R	7-9’
Winter jasmine *Jasminum nudiflorum*	1	a, b	All	M	2-4’
Beautyberry *Callicarpa americana*	1, 7, 8, 9	a, b	CP	M	3-5’
Rugosa rose *Rosa rugosa*	1, 5, 6, 7, 9	a, b	All	R	4-6’
Scotch broom *Cytisus scoparius*	1, 9	a, b	All	R	5-7’
Rose acacia *Robinia hispida*	1	a, b, c	All	R	5-8’
Elderberry *Sambucus canadensis*	2, 7	d	All	R	9-12’
New Jersey tea *Ceanothus americanus*	1	a, b, c	All	M	2-4’
Shining sumac *Rhus copallina*	1, 8, 9	a, b, c	All	R	11-15’
Smooth sumac *Rhus glabra*	1, 8, 9	a, b, c	P, MTS	R	12-20’
Fragrant sumac *Rhus aromatica*	1	a, b, c	P	R	3-6’
Coralberry *Symphoricarpos orbiculatus*	1, 8	a, b	P, MTS	M	1-2’
‘Bankers’ dwarf willow *Salix cottetii*	2	a, d	CP, P	R	4-5’
‘Streamco’ purpleosier willow *Salix purpurea*	2	a, d	CP, P	R	6-12’
G. TREES					
Black locust *Robinia pseudo-acadia*	1, 7, 8	a, b, c	P, MTS	R	75-80’
Carolina laurel cherry *Prunus caroliniana*	2, 3, 4, 5, 8, 9	a, b, c, f	CP, P, MTS	R	15-30’
Eastern red cedar *Juniperus virginiana*	1, 3, 5, 7, 8	a, b, c, f	CP, P, MTS	M	40-50’
Loblolly pine *Pinus taeda*	1, 2, 3, 6, 7, 8	1, b, c, d, e	CP, P	R	90-100’
Virginia pine *Pinus virginiana*	1, 3, 5, 7, 8	a, b, c, e	CP, P, MTS	M-R	40-50’
Eastern redbud *Cercis canadensis*	1, 2, 7, 8	a, b, c, f	CP, P, MTS	M-R	15-45’
River birch *Betula nigra*	1, 2, 7, 8	a, b, c, f	CP, P, MTS	M-B	50-60’

KEY
Conservation Uses:

1. Critical area erosion control and beautification
2. Shorelines, stream and ditch banks
3. Screens and windreaks
4. Clipped hedges
5. Foot traffic barriers
6. City conditions smog, etc.)
7. Songbird game bird food or cover
8. Upland game bird food or cover
9. Seashore

KEY
Soil & Site Conditions:

a. Infertile soils
b. Dry sites
c. Acid soils
d. Wet sites
e. Steep cuts
f. Shady locations

342-E Coastal Dune Specification Guide

Along the coastal beaches where blowing sand is a problem and where there is a need to build protective dunes, prevent damaging erosion of established dune areas, prevent accumulation of sand over roads, walks, buildings, and other man-made works, and impede sand encroachment and burying of sites already protected by perennial woody vegetation.

I. Planting Stock

A. American beachgrass stems are used to establish plantings for stilling sand in beach areas. Three cultivars of American beachgrass are in commercial production: "Bogue," "Hatteras," and "Cape."

II. Planting Date

A. Plantings are made during the dormant season from about November 15 to April 1.

III. Plant Material

A. Plants will be certified (or better) material and will be planted within three weeks of harvest. Harvesting and certification tags should be provided by grower. Culms will be a minimum of 14" long. Plants will be properly stored or "heeled in" until planted.

B. Use of Sea Oats **-** In some areas, American beachgrass declines after several years. Consequently, the long lived sea oats should be introduced into the planting. This should be done in late March through May. Six rows at 3' x 3' spacing is enough to introduce the sea oats on a dune building job. Sea oats are available from commercial nurseries. Local ecotypes are preferred. Stems are planted about 4"-6" deep with a third or more of the stem surface buried. Deep planting is the secret of success. Sea oats gradually spread and help restore the dune ecosystem.

IV. Methods

A. Each plant, with two or three stems, is planted 4 to 6 inches deep. A good tool for this job is a narrow bladed short handle spade or tree dibble.

B. On large, level sites, mechanical tobacco planters modified for deep planting have been used successfully. In all cases, the sand is thoroughly firmed around each plant after planting.

V. Spacing of Plants

A. For ordinary sand stilling on large bare sand areas, plants may be planted in 3' rows with plants 2' apart in the row. This is getting close to a maximum spacing, and amounts to 7,260 plants per acre.

B. Where the force of the wind is severe, such as "blowouts," guts between dunes, dune tops, etc., use 1-1/2' rows with plants 1' apart.

VI. Dune Building

A. The vigor of American beachgrass enables it to grow up and through sand which drifts around it. Thus, dunes can be built by planting long parallel rows of grass. Such plantings are most often used to restore the frontal dune. Width of these plantings, number of rows vary considerably. But generally, for a small group project or an individual's undertaking, planting might vary from 12 to 24' wide. The rows are laid out so that the ones toward the center are closest. The middles get progressively wider toward both edges of the planting rather than pile up along the outside rows. Thus, a planting may have middles reading from outside to outside in feet: 3, 2, 1-1/2, 1, 1-1/2, 2, 3; a total of 8 rows, 14' wide. For a larger planting, add outside rows with 4' middles. All plants in the row are spaced 1-1/2' apart.

B. Dune building may be accelerated by using straw bales or installing a sand fence along the centerline of the proposed dune. Rows, as above, are planted when the sand is within a foot or less of the top of the fence or when the bales have been covered.

VII. Fertilization

A. <u>Year of Establishment</u>: Broadcast 15 pounds of 30-10-0 per 1,000 square feet (or equivalent) two weeks after planting. Lacking that, 10-10-10 or similar fertilizer is acceptable.

B. <u>Maintenance</u>: Fertilize as above each April until good cover is established.