Channel Bank Vegetation (pen & ink change 11/05)

~~Channel Vegetation~~ (acre)

Definition

Establishing and maintaining adequate plants on channel banks, berms, spoil, and associated areas.

Purpose

To stabilize channel banks and adjacent areas and reduce erosion and sedimentation. To maintain or enhance the quality of the environment, including visual aspects and fish and wildlife habitat.

Scope

This standard applies to the vegetation of open channels, streams, or ditches. It applies to floodwater diversions (400), floodways (404), open channels (582), stream channel stabilization (584), streambank protection (580), and surface drainage, main or lateral (607-B). It does not apply to diversions (362), grassed waterways or outlets (412), or surface drainage, field ditches (607-A).

Conditions where practice applies

On channel banks, berms, spoil, and associated areas; except grassed waterways, diversions and areas with protective linings, those covered with water for an extended period, or in areas where conditions will not support adequate vegetation.

Planning considerations

Evaluate slopes and soil material, time of year for proper establishment of vegetation, necessity for irrigation, visual aspects, fish and wildlife, fire hazards and special needs when construction is done from one side. Other considerations include:

1. Protection of channel vegetation from sediment deposits resulting from wind and water erosion;

2. Provisions for safety and protection of human life and property in all aspects of designs, application, and maintenance;

3. Methods by which endangered and threatened plants and nationally recognized natural vegetated areas will be identified and protected;

4. Requirements for overseeding or planting woody or herbaceous vegetation on the unexcavated side when construction is done from one side;

5. Identification of desirable trees and other vegetation and means for their presentation; and

6. Special techniques for establishing and maintaining vegetation near inlets, outlets, or other appurtenances.

Water Quantity

1. Potential runoff from bare soil during construction.

2. Effects on the water budget components, especially on volumes and rates of runoff.

Water Quality

1. Effects of nutrients or pesticides in runoff during establishment of vegetation.

2. Effects of streambank erosion before vegetative establishment.

Specifications guide

An adequate vegetative cover stabilizes the channel area and provides for temporary or permanent protection or both.

Side slopes

Specify side slopes that permit establishing and maintaining desired vegetation and that have been effective in the past. In urban and recreation areas, flatter side slopes may be required to provide for public safety and enhancement of visual resources.

Species selection

Specify species that are suited to the soil, climate, and exposure. They must provide a lasting cover to protect the channel area and to maintain the channel design capacity. Use special purpose plantings outside the channel for wildlife, recreation, or visual resources.

Seedbed preparation

Specify seedbed preparation, fill rills and gullies, and remove stones and debris.

Fertilizer and soil amendments

Specify fertilizers and soil amendments, including analyses, rate, method of application, and requirements for topdressing.

Planting

Specify dates, rates, and methods of seeding, sprigging, sodding or planting.

Mulching

Specify types and rates of mulch materials and the methods of anchoring.

Irrigation

Specify irrigation if it is needed for establishing vegetation.

Controlled access

Control access to channels, as needed by fencing or by other means to protect slopes and vegetation from damage.

Maintenance

1. Periodic inspection and evaluation of channel vegetation to determine maintenance needs.

2. Management of vegetation growth, as applicable, by mowing, controlled grazing, approved chemicals, or by other means to maintain the desired cover.

3. Reseeding or replanting, along with the use of fertilizers and/or soil amendments and irrigation, as needed.

4. Repair of appurtenances and fences.

U.S. DEPARTMENT OF AGRICULTURE
Soil Conservation Service

Technical Guide
Section IV
Rev. April 1991

Channel Bank Vegetation (pen & ink change 11/05)

~~CHANNEL VEGETATION~~ (Acre)

Specifications Guide

A. **Table of Plants and Mixtures of Plants for Channel Vegetation** (See attached Table 1.)

B. **Site Preparation**

1. Where practical and feasible, shape all areas to be seeded to permit the use of conventional equipment in the establishment and maintenance of vegetation.

2. Where ditch side slopes are to be seeded and maintained with conventional equipment, slope the banks to a 3:1 ratio or flatter.

3. Slopes that are too steep for conventional equipment (3:1 or steeper) should not be disturbed if they are relatively smooth and uniform. These slopes are best seeded with hydro-seeding equipment.

4. Where hydro-seeding equipment is not available for use on steep slopes (3:1 or steeper), scarify the soil surface with a chain harrow, pick chain, grader blades with chisels, hand tools or other equipment that will pit the soil or make trenches approximately 1 to 2 inches deep, 6 to 12 inches apart across the slope into which the seed can lodge and germinate.

5. Smoothing the spoil is desirable, but not necessary when seeding with hydraulic equipment or by hand.

6. 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 plants or mixture of plants.

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

C. **Lime and Fertilizer**

1. Where soils are reasonably uniform, lime and fertilize according to soil test recommendations. In the absence of a soil test, apply 2 tons lime per

acre and fertilize with the amounts and analysis shown below. Lime and fertilizer shall be spread uniformly over the area to be planted.

2. A soil test shall be required in areas where excessive acidity or alkalinity are expected.

   a. Grasses alone: 700 to 1,000 pounds of 10-10-10 or equivalent per acre.

   b. Mixtures of grasses and legumes or legumes alone: 700 to 1,000 pounds of 5-10-10 or equivalent per acre.

   c. Normally an additional application of nitrogen or complete fertilizer is needed within three (3) to twelve (12) months. Application should be timed to growing cycle of the species being established.

3. Where possible, mix lime and fertilizer into the soil by disking or harrowing to a depth of approximately 3 inches. Otherwise, broadcast on soil surface or apply with hydraulic seeding equipment.

D. **Selecting Plants**

1. Trees and shrubs are not covered in these specifications. They may be used where they are compatible with the engineering design. Job specifications (P.L. 566) for use of trees and shrubs for channel vegetation should be developed in consultation with the State Resource Conservationist.

2. Guide to selecting plants from Table 1:

   a. Consider site conditions, time of planting, and maintenance requirements.

   b. Plants for droughty sites - Bahiagrass, Bermudagrass, sericea lespedeza, weeping lovegrass, and crownvetch.

   c. Plants for wet sites - Tall fescue, maidencane, and reed canarygrass.

   d. Plants for variable or mixed soil conditions - One of the plants named above or kudzu or bermudagrass may be adapted. A mixture of plants will usually be more practical than a single plant to provide cover on these sites.

e. Seeding of annuals or a mixture of annuals and perennials may be justified for sediment reduction when bare soil is exposed during the off-season for seeding the desired perennial alone.

f. Maintenance - Kudzu, sericea lespedeza, and crownvetch maintain land cover with a lower level of maintenance than the grasses.

E. **Establishment with Seeds**

1. From the attached table, select the best suited plant or mixture that is hardy and capable of withstanding abuse and will prevent erosion under adverse conditions for a long time.

2. Seed Specifications on contracts:

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

   b. Seed containing prohibited or restricted noxious weeds may not be accepted.

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

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

   e. The inoculant for treatment 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 seedings; four times the recommended rate if hydro-seeded.

3. Where hydraulic seeding equipment is used, seed fertilizer, and wood-fiber mulch materials are mixed into a slurry with water. Care should be used to spread the mixture evenly and soon after the mixture is made. Keep the mixture well agitated when seeding.

4. 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 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 1/2 to 1 inch, depending on the size of the seed.

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

F. **Establishment with Vegetative Material**

1. Table 1 shows the kinds of plants, planting material, and spacing to be used.

2. Bermudagrass stolons may be: Broadcast and disked into the top 1-2 inches of soil and firmed; dropped in shallow furrows, covered about 1-2 inches deep, and firmed; planted with a transplanter; or by opening holes with hand planting tools.

3. Crownvetch, kudzu, maidencane, and similar plants are planted in furrows, excavated holes, or by opening holes with planting irons. Plants should be set slightly deeper than they grew in the nursery.

G. **Mulching**

Mulch is essential on steep erosive sites where plant establishment may be expected to be difficult. 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.

1. Mulching materials

   a. Dry, unchopped, unweathered small grain 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 blower-type spreading equipment. Apply mulch uniformly so that about 25% of the ground surface is visible.

   b. Sericea lespedeza seed bearing stems at a rate of three tons per acre - This mulch may be applied green or dry, but must contain mature seed. Liming, fertilizing and land preparation should precede application of the sericea mulch.

c. Broomsedge hay mulch - Spread where it is desirable to establish this native plant.

d. 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.

e. Local materials such as burlap, tobacco plant bed netting, 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.

f. Barnyard manure and bedding - Apply uniformly so that about 25% of the ground surface is visible.

g. 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 acceptable 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.

h. 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 manufacturer's specifications for installing.

i. 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 a slurry, wood cellulose fiber mulch is self-anchoring.

j. 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.

2. 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.

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 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.

   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, or CRS-2); <u>medium setting</u> (MS-1, MS-2, or CMS-2); <u>slow setting</u> (SS-1 or CSS-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.

Medium setting (MS or CMS) is formulated for curing within 24 to 48 hours.

Slow setting (SS or CSS) is formulated for use during hot, dry weather with 40 hours or more curing time.

Note - 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.

f. Mulch can be anchored with rye for fall plantings or millet for summer plantings. Use 1/4 to 1/2 bushel of rye or 15 pounds of millet per acre broadcast ahead of mulch application.

H. Maintenance

Maintenance is the most important controllable factor in retaining an effective vegetative cover.

1. 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 the label.

2. Irrigation

If soil moisture is deficient, supply new plantings 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 and in abnormally dry or hot seasons.

3. Repairs

Inspect all areas for planting failures and make necessary repairs, replacements and reseeding within the planting season, if possible.

4. 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:

a. Apply 1 to 2 tons ground dolomitic limestone per acre, or 43 to 92 pounds per 1,000 square feet during late fall or winter every 3 to 4 years and fertilize annually or as needed to maintain healthy, vigorous growing plants.

b. Pure stands of tall fescue, bluegrass, and mixtures of tall fescue, red fescue, and similar cool season plants. Apply 400 to 500 pounds per acre or 9 to 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.

c. Pure stands of bermuda, bahia, lovegrass and similar warm season grasses. Apply 400 to 500 pounds per acre or 9 to 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 to 90 pounds of nitrogen per acre or 1 to 2 pounds per 1,000 square feet, during the growing season. When the higher rate is used, apply the split applications.

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

e. Mixtures of sericea lespedeza, fescue, lovegrass, or bermudagrass. Fertilize in late winter or early spring with 400 to 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.

f. Fescue-white clover, bluegrass-white clover and similar mixtures. Apply 400 to 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.

5. Weed and Brush Control

Mow grasses at least annually to control weeds and undesirable woody vegetation. Crownvetch should be mowed only when necessary and mower must not cut below 12 inches. Kudzu and sericea lespedeza may be mowed annually, but only after a killing frost.

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

When weeds cannot be controlled mechanically, apply chemicals in accordance with current "North Carolina Agricultural Chemicals Manual" recommendations and adhere strictly to instructions on label.

CAUTION: Pesticides are dangerous. Use only as directed and heed all precautions on the container label. Check the registration number and be sure that the directions for use include the target pests. Drift from aerial spraying can contaminate nearby crops and forage, lakes, and reservoirs. Improper use and careless disposal of unused portions can lead to poisoning of humans, domestic animals, desirable plants, pollinating insects, fish, and wildlife, and can contaminate water supplies.

PLANTS	PLANTING RATES/AC	PLANTING DATES 1. Coastal Plain 2. Piedmont 3. Mountains	NOTES
10. Maiden cane (plants)	Space 2'x2' 11,000 plants dig native plants	1. Late winter/ spring 2. Late winter/ spring	Adapted to all of the Coastal Plain and southeastern half of Piedmont. Good on stream and canal banks, not for small laterals and small stream channels with low velocity.
11. Reed Canarygrass	15-20 lbs.	2. Aug. 20-Sept. Feb. 15-April 3. March-July	Excellent on berms, stream banks and at edge of water- do not use on small streams with low velocity.
12. Sericea Lespedeza (scarified)	40-50 lbs.	1. March-May 2. Mar. 15-June 3. April-May	Avoid wet sites - will persist and furnish cover on eroded droughty sites and subsoil material.
13. Sericea Lespedeza (unscarified)	50-60 lbs.	1. Oct.-February 2. Sept. 15-Feb. 3. Sept.-March	Tolerates low level of management. May be seeded alone or overseeded on Fescue, Lovegrass, smallgrain and other compatible plants and during the fall and winter months.
14. Sericea Lespedeza (scarified) and Pensacola Bahiagrass	25-35 lbs. 20-30 lbs.	1. March-May	Adapted south of line - Rockingham to Washington, North Carolina. Tolerates low level of management.
15. Sericea Lespedeza (scarified) and Weeping Lovegrass	40-50 lbs. 4-5 lbs.	1. March-May 2. March 15-June 3. April-May	Lovegrass provides quick protective cover.
16. Sericea Lespedeza (scarified) and Common Bermudagrass	40-50 lbs. 6-8 lbs.	1. March-May 2. March 15-June 3. April-May	Bermuda provides quick land cover, spreads and heals in open areas. Bermudagrass usually disappears where Sericea establishes a canopy.
17. Sericea Lespedeza (scarified) and Tall Fescue	40-50 lbs. 25-30 lbs.	1. March-April 2. March-April 3. April-May	Scarified Sericea may be spring seeded on Fescue seeded the previous fall.

PLANTS	PLANTING RATES/AC	PLANTING DATES 1. Coastal Plain 2. Piedmont 3. Mountains	NOTES
18. Sericea Lespedeza (unscarified) and Tall Fescue	50-60 lbs. 25-30 lbs.	1. Sept.-Nov. 2. Aug. 15-Oct. 3. July 15-Sept.	If Sericea seed unavailable at planting time, it may be overseeded on Fescue later in the winter.
19. Tall Fescue	40-60 lbs.	1. Sept.-Nov. Feb.-Mar. 2. Aug. 15-Oct. Feb. 15-Apr. 15 3. July 15-Sept. March-April	Not well suited to infertile, droughty, sandy soils. Requires good maintenance. Seeding date in mountains varies with elevation and aspect.
20. Tall Fescue and Ladino Clover	30-50 lbs. 3-4 lbs.	1. Sept.-Nov. Feb.-March 2. Aug. 15-Oct. Feb. 15-April 15 3. July 15-Sept. March and April	Can be used where regular mowing is desired and high level of maintenance will be provided.
21. Tall Fescue and Red Fescue	20-30 lbs. 15-20 lbs.	2. Aug. 20-Oct. 10 Feb. 15-Apr. 15 3. July 15-Sept. 1 March and April	Red Fescue in this mixture has a tendency to fill in voids. It is shade tolerant.
22. Tall Fescue and Bluegrass	20-30 lbs. 10-15 lbs.	2. Aug. 15-October Feb. 15-Apr. 15 3. July 15-Sept. March-April	Limited to fertile, well-drained soils in Northern Piedmont and Mountains.
23. Tall Fescue and Browntop Millet Sorghum-Sudan Hybrids	40-60 lbs. 25-35 lbs. 25-30 lbs.	1. Aug.-Sept. 2. July 15-August 3. July-Aug. 15	Keep annuals cut back to 10-12 inches. Mulching is desirable.
24. Tall Fescue and Rye	40-60 lbs. 25-30 lbs.	1. Dec.-Jan. 2. Nov.-Jan. 3. Oct.-Feb.	Use only when necessary to complete a job. Mulching will be necessary to provide erosion control. Keep annuals cut back to 10"-12".

There will be conditions and interest that will warrant the use of other plants or mixtures not listed in the above table. Their use should be evaluated for each site.

Some rules of thumb for conversions:

Lbs./Ac. x .367	=	Oz./1,000 sq. ft.
Lbs./Ac. x .0023	=	Lbs./100 sq. ft.
Lbs./Ac. x .023	=	Lbs./1,000 sq. ft.
Lbs./Ac. x .000207	=	Lbs./Sq. Yd.
Lbs./Ac. x .0207	=	Lbs./100 sq. yds.
Lbs./Ac. x .207	=	Lbs./1,000 sq. yds.
Sq. Ft. of area x .000023	=	Acres (valid up to 10 acres)