

## Filter Strip (FS)



### Practice Description

A filter strip is a wide belt of vegetation designed to provide infiltration, intercept sediment and other pollutants, and reduce stormwater flow and velocity. Filter strips are similar to grassed swales except that they are designed to intercept overland sheet flow (not channel flow). They cannot treat high-velocity flows. Surface runoff must be evenly distributed across the filter strip. Vegetation may consist of existing cover that is preserved and protected or that is to be planted to establish the strip. Once a channel forms in the filter strip, the filter strip is no longer effective. This practice applies on construction sites and other disturbed areas.

### Planning Considerations

Filter strips provide their maximum benefit when established as early as possible after disturbances begin. This concept should receive strong consideration during the scheduling of practices to be installed. In some instances, the existing vegetation may be preserved to serve as a filter strip.

Filter strips should be strategically located on the contour to reduce runoff and increase infiltration. They should be situated downslope from the disturbed site and where runoff-water enters environmentally sensitive areas.

Overland flow entering filter strips should be primarily sheet flow. All concentrated flow should be dispersed prior to entering the filter strip.

Flow length should be based on slope percent and length, predicted amount and particle size distribution of sediment delivered to the filter strip, density and height of the filter strip vegetation, and runoff volume.

The slope of the drainage area above a filter strip should be greater than 1% but less than 10%. The ratio of the drainage area to the filter strip should be less than 50:1.

Existing vegetation may be used if it meets stand density and height requirements and provides for uniform flow through the existing vegetation. The existing vegetation strip must be on a contour to be effective.

Site preparation for filter strips requires that the filter strip be placed on the contour. Variation in placement on the contour should not exceed a 0.5% longitudinal (perpendicular to the flow length) gradient.

All soil amendments should be applied according to a soil test recommendation for the planned vegetation.

The vegetation for filter strips must be permanent herbaceous vegetation of a single species or a mixture of grasses or legumes that have stiff stems and a high stem density near the ground surface. Stem density should be such that the stem spacing does not exceed 1".

## **Design Criteria and Construction**

### **Installation (Preservation of Existing Vegetation)**

Prior to start of installation, filter strips should be designed by a qualified professional. Plans and specifications should be referred to by field personnel throughout the construction process.

Designate the areas for preserving vegetation on the design plan map.

Indicate in the plan that the designated areas will be fenced or flagged and will not be disturbed. This includes avoiding surface disturbances that affect sheet flow of stormwater runoff and not storing debris from clearing and grubbing, and other construction waste material, in the filter strips during construction.

### **Installation (Planting)**

#### **Site Preparation**

If the upper edge of the filter strip does not have a level edge, remove any obstructions and grade the upper edge of the filter strip so that runoff evenly enters the filter strip.

Fill and smooth any rills and gullies that exist over the filter strip area to ensure that overland flow will discharge across the filter strip along a smooth surface.

#### **Seedbed Preparation**

Grade and loosen soil to a smooth firm surface to enhance rooting of seedlings and reduce rill erosion. If existing, break up large clods and loosen compacted, hard, or crusted soil surfaces with a disk, ripper, chisel, harrow, or other tillage equipment. Avoid preparing the seedbed under excessively wet conditions.

For broadcast seeding and drilling, tillage should adequately loosen the soil to a depth of at least 6", alleviate compaction, and smooth and firm the soil for the proper placement of seed.

For no-till drilling, the soil surface does not need to be loosened unless the site has surface compaction. If compaction exists, the area should be chiseled across the slope to a depth of at least 6".

## Applying Soil Amendments

### Liming

Follow soil test recommendation. If a soil test is not available, use 2 tons/acre of ground agricultural lime on clayey soils (approximately 90 lbs/1000 ft<sup>2</sup>) and 1 ton/acre on sandy soils (approximately 45 lbs/1000 ft<sup>2</sup>). (Exception: If the cover is tall fescue and clover, use the 2 tons/acre rate (90 lbs/1000 ft<sup>2</sup>) on both clayey and sandy soils.)

Spread the specified amount of lime and incorporate into the top 6" of soil after applying fertilizer.

### Fertilizing

Apply fertilizer at rates specified in the soil test recommendation. In the absence of soil tests, use the following as a guide:

Grass alone: 8-24-24 or equivalent - 400 lbs/acre (9.2 lbs/1000 ft<sup>2</sup>). When vegetation has emerged to a stand and is growing, 30 to 40 lbs/acre (0.8 lb/1000 ft<sup>2</sup>) of additional nitrogen fertilizer should be applied.

Grass-legume mixture: 8-24-24 or equivalent-400 lbs/acre (9.2 lbs/1000 ft<sup>2</sup>). When vegetation has emerged to a stand and is growing, 30 to 40 lbs (0.8 lb/1000 ft<sup>2</sup>) of additional nitrogen fertilizer should be applied.

Legume alone: 0-20-20 or equivalent-500 lbs/acre (11.5 lbs/1000 ft<sup>2</sup>).

*Note: Fertilizer can be blended to meet exact fertilizer recommendations. Take soil test recommendations to local fertilizer dealer for bulk fertilizer blends. This may be more economical than bagged fertilizer.*

Incorporate lime and fertilizer to a minimum depth of at least 6" or more by disking or chiseling on slopes of up to 3:1.

## Planting

Plant the species specified in the plan at the rate and depth specified. In the absence of plans and specifications, plant species and seeding rates may be selected by qualified persons using Figure FS-1 and Table FS-1.

Apply seed uniformly using a cyclone seeder, drill seeder, cultipacker seeder, or hydroseeder.

When using a drill seeder, plant grasses and legumes ¼" to ½" deep. Calibrate equipment in the field.

When planting by methods other than a drill seeder or hydroseeder, cover seed by raking or by dragging a chain, brush, or mat. Then firm the soil lightly with a roller. Seed can also be covered with hydro-mulched wood fiber and tackifier. Legumes require inoculation with nitrogen-fixing bacterial to ensure good growth. Purchase inoculum specific for the seed and mix with seed prior to planting.

## Mulching

Cover 65% to 75% of the surface with the specified mulch materials. Crimp, tack, or tie down straw mulch with netting. Mulching is extremely important for successful seeding (see *Mulching Practice* for more details.)

## Construction Verification

Check materials and installation for compliance with specifications during installation of products.

Table FS-1 Commonly Used Plants for Permanent Cover

Species	Seeding Rates/Ac PLS <sup>1</sup>	North Seeding Dates	Central	South
Bahia grass, <sup>2</sup> Pensacola	40 lbs	--	Mar 1-July 1	Feb 1-Nov 1
Bermuda grass, Common	10 lbs	Apr 1-July 1	Mar 15-July 15	Mar 1-July 15
Bahia grass, Pensacola Bermuda grass, Common	30 lbs 5 lbs	--	Mar 1-July 1	Mar 1-July 15
Bermuda grass, Hybrid (Lawn Types)	Solid sod	Anytime	Anytime	Anytime
Bermuda grass, Hybrid (Lawn Types)	Sprigs 1/sq ft	Mar 1-Aug 1	Mar 1-Aug 1	Feb 15 - Sep 1
Fescue, Tall	40-50 lbs	Sep 1-Nov 1	Sep 1-Nov 1	--
Sericea	40-60 lbs	Mar 15-July 15	Mar 1-July 15	Feb 15 -July 15
Sericea & Common Bermuda grass	40-60 lbs 10 lbs	Mar 15 -July 15	Mar 1-July 15	Feb 15-July 15
Switch grass, Alamo	4 lbs	Apr 1-Jun 15	Mar 15-Jun 15	Mar 15-Jun 15

<sup>1</sup> A late-fall planting of Bahia grass should contain 45 pounds of small grain to provide cover during winter months.

<sup>2</sup> PLS means pure live seed and is used to adjust seeding rates. For example, to plant 10 lbs of a species with germination of 80% and with 10% inert material, 10 PLS = 10 lbs/80% - 10% = 10/0.70 = 14.3 lbs.

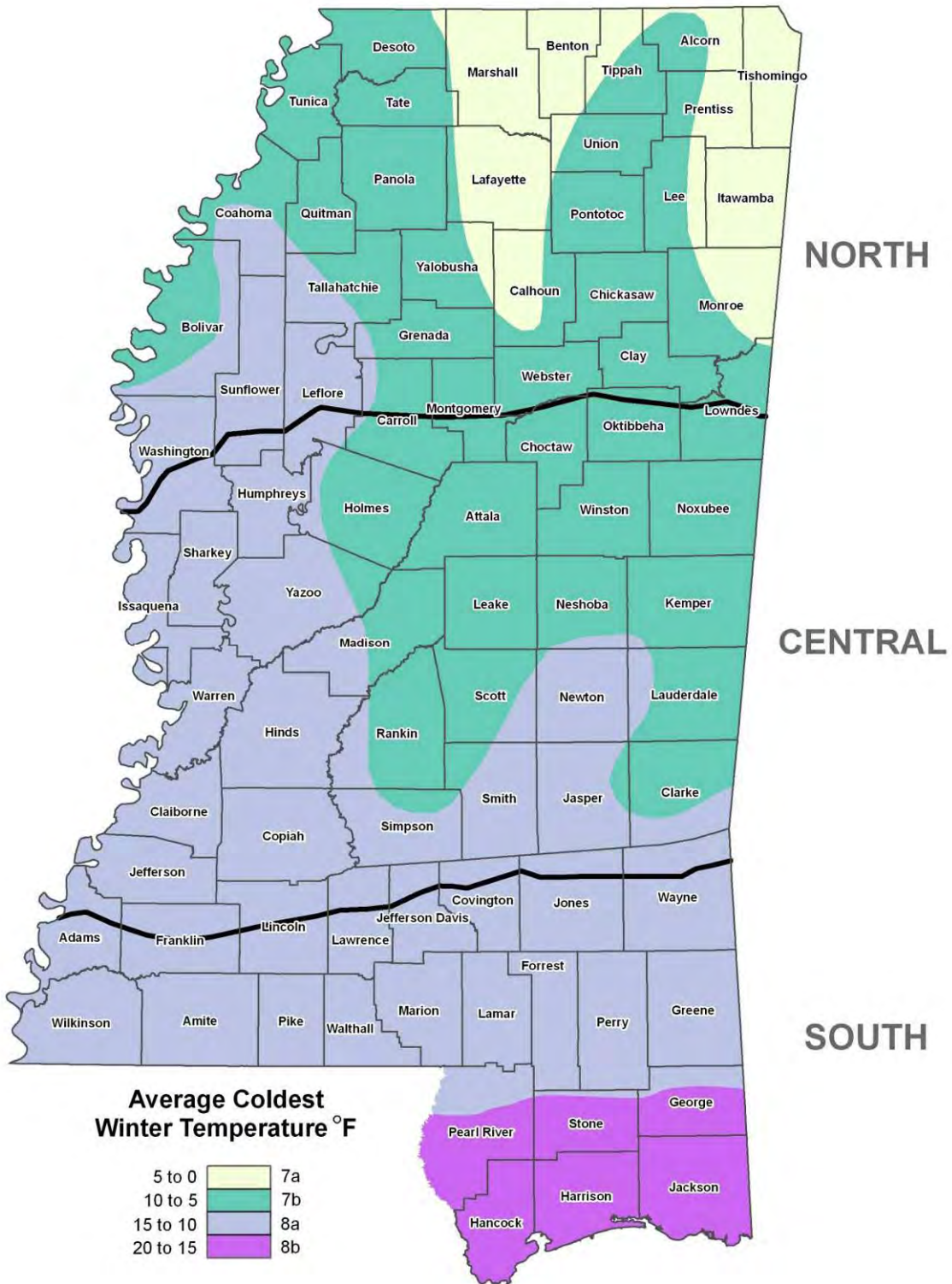


Figure FS-1 Geographical Areas for Species Adaptation and Seeding Dates

## Common Problems

*Consult with a qualified design professional if any of the following occurs:*

Variations in topography on-site indicate filter strip will not function as intended.

Design specifications for seed variety, seeding dates, or mulching cannot be met; substitutions may be required. Unapproved substitutions could lead to failure.

Seeding at the wrong time of the year results in an inadequate stand. Reseed according to specifications of a qualified professional.

Inadequate mulching results in an inadequate stand, bare spots, or eroded areas; prepare seedbed, reseed, cover seed evenly, and tack or tie down mulch, especially on slopes, ridges, and in channels (see recommendations under *Maintenance*).

## Maintenance

### Erosion

Check for eroded channels in the filter strip after every storm event until the vegetation is well established. Eroded areas should be repaired by filling and/or smoothing and by reapplication of lime, fertilizer, seed, and mulch. It is particularly important that the surface is smooth and promotes sheet flow of storm runoff.

Generally, a stand of vegetation cannot be determined to be fully established until vegetative cover has been maintained for at least 1 year after planting.

### Reseeding

Inspect seeding monthly for stand survival and vigor.

If stand is inadequate, identify the cause of failure—choice of plant materials, lime and fertilizer quantities, poor seedbed preparation, or weather—and take corrective action. If vegetation fails to grow, have the soil tested to determine whether pH is in the correct range or if nutrient deficiency is a problem.

Stand conditions, particularly percent coverage, will determine the extent of remedial actions such as seedbed preparation and reseeding. A qualified professional should be consulted to advise on remedial actions. Consider drill seeding if enough residue exists.

### Fertilizing

Establishment may require refertilizing the stand in the second growing season. Follow soil test recommendations or the specifications provided for establishment.

### Mowing

Mow vegetation to prevent woody plants from invading.

Certain species can be weakened by mowing regimes that significantly reduce their food reserves stored for the next growing season. Fescue should not be mowed closer than 4" during the summer. Sericea should not be mowed closer than 4" during the growing season, and it should not be mowed at all between late summer and frost. Bermuda grass

and Bahia grass are tolerant of most mowing regimes and can be mowed often and close, if so desired, during their growing season.

## References

### Volume 1

#### Chapter 2

Vegetation for Erosion and Sediment Control 2-10

#### Chapter 4

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Permanent Seeding (PS) 4-53

Preservation of Vegetation (PV) 4-64

Temporary Seeding (TS) 4-103