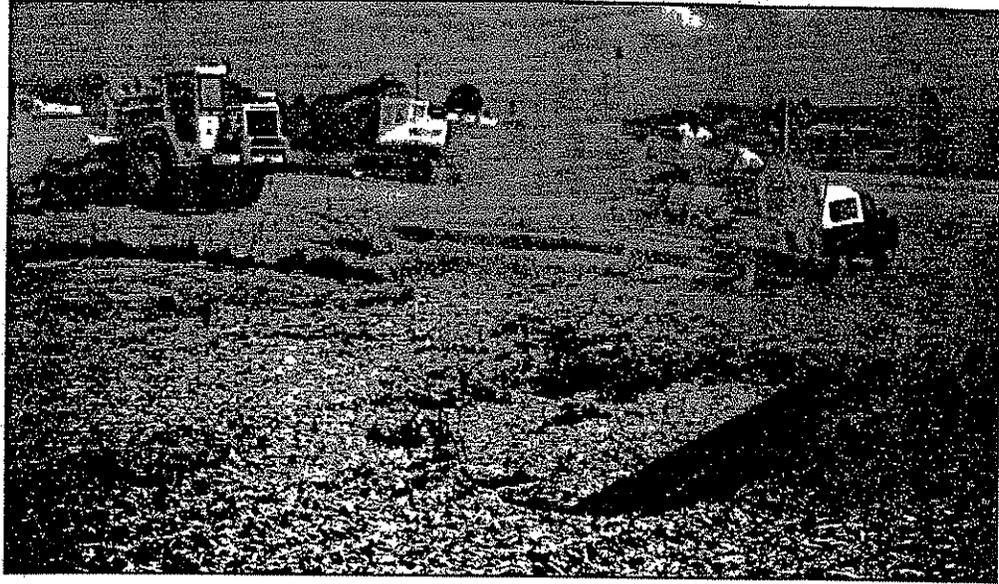


**ATTACHMENT B**

## MULCHING

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### DESCRIPTION

Applying a protective layer of mulch, usually of straw, to bare soil is used to abate erosion by shielding it from raindrop impact to helping establish vegetation by conserving moisture and creating favorable conditions for seeds to germinate.

### CONDITIONS WHERE PRACTICE APPLIES

Mulch should be used liberally throughout construction to limit the areas that are bare and susceptible to erosion. Mulch can be used in conjunction with seeding to establish vegetation or by itself to provide erosion control when the season does not allow grass to grow. Mulch and other vegetative practices must be applied on all disturbed portions of construction-sites that will not be re-disturbed for more than 45 days.

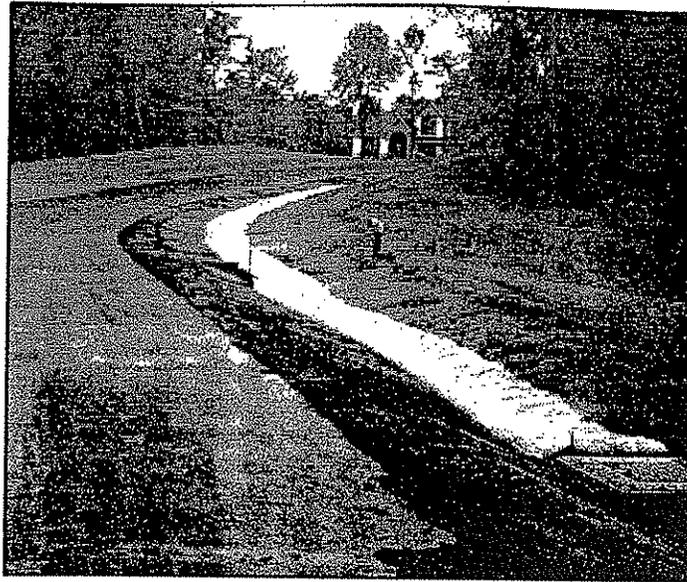
Specifications  
for  
Mulching

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1. Mulch and/or other appropriate vegetative practices shall be applied to disturbed areas within 7 days of grading if the area is to remain dormant (undisturbed) for more than 45 days or on areas and portions of the site which can be brought to final grade.
2. Mulch shall consist of one of the following:
  - Straw--Straw shall be unrotted small grain straw applied at the rate of 2 tons/ac. or 90 lb./1,000 sq. ft. (two to three bales). The straw mulch shall be spread uniformly by hand or mechanically so the soil surface is covered. For uniform distribution of hand-spread mulch, divide area into approximately 1,000-sq.-ft. sections and place two 45-lb. bales of straw in each section.
  - Hydroseeders--Wood cellulose fiber should be used at 2,000 lb./ac. or 46 lb./1,000 sq. ft.
  - Other--Other acceptable mulches include mulch mattings applied according to manufacturer's recommendations or wood chips applied at 10-20 tons/ac.
3. Mulch Anchoring--Mulch shall be anchored immediately to minimize loss by wind or runoff. The following are acceptable methods for anchoring mulch.
  - Mechanical--Use a disk, crimper, or similar type tool set straight to punch or anchor the mulch material into the soil. Straw mechanically anchored shall not be finely chopped but be left generally longer than 6 in.
  - Mulch Nettings--Use according to the manufacturer's recommendations, following all placement and anchoring suggestions. Use in areas of water concentration and steep slopes to hold mulch in place.
  - Asphalt Emulsion--For straw mulch, apply at the rate of 160 gal./ac. (0.1 gal./sq.) into the mulch as it is being applied or as recommended by the manufacture.
  - Synthetic Binders--For straw mulch, synthetic binders such as Acrylic DLR (Agri-Tac), DCA-70, Petroset, Terra Tack or equal may be used at rates recommended by the manufacturer.
  - Wood Cellulose Fiber--Wood cellulose fiber may be used for anchoring straw. The fiber binder shall be applied at a net dry weight of 750 lb./acre. The wood cellulose fiber shall be mixed with water and the mixture shall contain a maximum of 50 lb./100 gal. of wood cellulose fiber.

## MATTING

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### DESCRIPTION

Matting such as excelsior or jute matting is used to stabilize easily eroded areas such as channels and steep slopes while vegetation is becoming established.

### CONDITIONS WHERE PRACTICE APPLIES

Matting should be used on:

- Channels where the designed flow exceeds 3.5 fps,
- Steep slopes,
- Problem areas that have highly erosive soils,
- Areas that may be slow to establish adequate vegetative cover.

## DESIGN CRITERIA

**Materials--**Matting is available in many acceptable materials that provide excellent soil protection. Two acceptable materials are jute and excelsior matting. Excelsior matting is a wood fiber mulch covered with plastic netting on one or both sides. Jute matting is a woven cloth of jute yarn and may be used in conjunction with organic mulch. Both are widely available, easily installed, and adaptable to most site conditions.

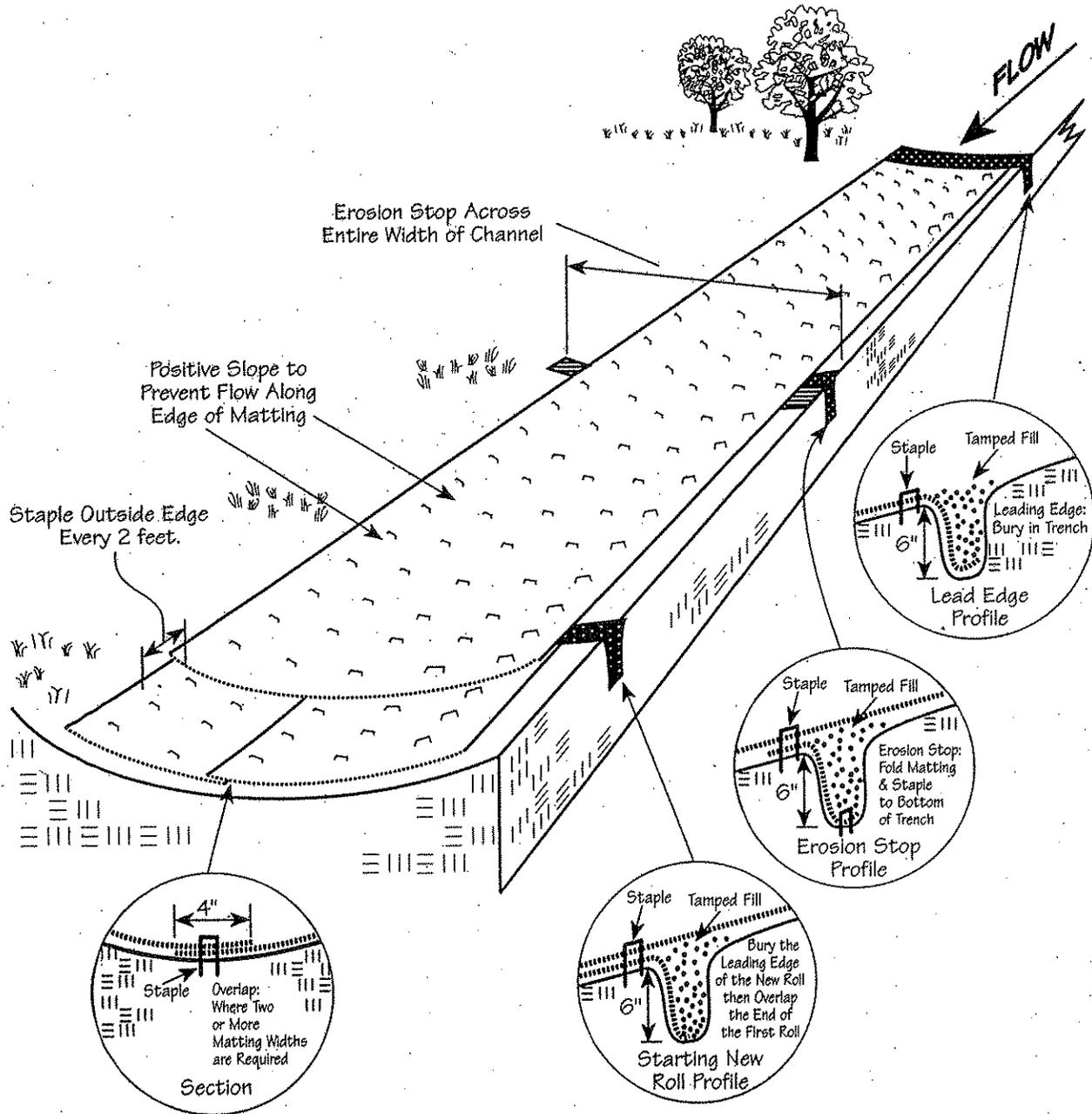
**Grade of Matting--**The specific grade of a matting should be specified. Matting is available in many different grades for a wide range of uses and site conditions.

**Channel Width--**Channels often require several widths of mattings. The width of coverage should be specified for individual sections of channel.

**Manufacturers Instructions--**Matting manufacturers usually provide detailed installation instructions for their products. The manufacturer's instructions should be referenced during design and included in construction plans. If instructions are not available, the following guidelines listed in the specifications for matting may be used.

**Erosion Stops--**Erosion stops are made of strips of matting placed in narrow trenches 6-12 in. deep across the full cross section of the channel. The strips are installed under the channel lining matting. Erosion stops prevent undermining and gullies from forming beneath the matting. They should be specified when recommended by the matting manufacturer and for areas of high-erosion potential such as where rocky conditions may prevent good soil matting contact, erosive soils or steep slopes. Depending on erosion potential, specifications should require erosion stops spaced from 20-100 ft. apart.

# Specifications for Matting



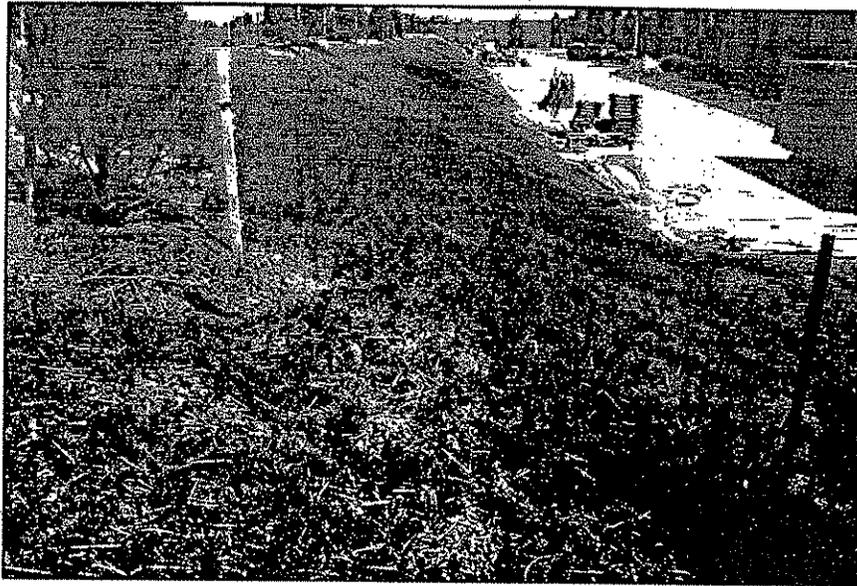
Specifications  
for  
Matting

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1. Material--Excelsior matting shall be 48 in. wide and weigh an average of 0.75 lb./sq. yd. or greater. Jute matting shall be 48 in. wide and weigh an average of 1.2 lb./yd or greater. Matting made of other material and providing equal or greater stabilization than the above may be substituted.
2. Site Preparation--After the site has been shaped and graded, a seedbed shall be prepared that is relatively free of foreign material, clods or rocks that are greater than 1.5 in. in diameter. The site shall be prepared to ensure that the matting has good soil contact and the matting will not "bridge" or "tent" over obstructions.
3. Matting shall be held in place as recommended by the manufacturer as adequate for the site conditions or with sod staples. Sod staples are U-shaped wire staples used for fastening sod, jute or excelsior matting and other erosion-control materials to the soil surface. Sod staples shall be No. 11 gauge or heavier and be 6-10 in. in length. In loose or sandy soils longer staples shall be used.
4. Planting--Lime and fertilizer shall be used according to the recommendation of a soil test or the seeding plan. Seed according to the matting manufacturer's recommendations; or, for excelsior matting, seed area to be protected before installation; or, when using jute matting, apply half the seed before and half the seed after installation.
5. Matting shall be installed as specified by the manufacturer as appropriate for the site conditions or the following procedure may be used:
  - After the site is prepared and erosion stops are installed, start laying the mat from the top of the slope or channel and unroll the matting allowing 4-in. overlaps at the edges.
  - Secure the matting by burying the top ends in a trench 6 in. deep and staple the folded ends to the bottom of the trench. Backfill and tamp firmly to the established grade.
  - Staple matting every 12 in. across the width beginning at the edges and every 2 ft. in rows the entire length of the matting. Every other row of staples running the length of the matting should be staggered.
6. Erosion stops shall be used where recommended by the matting manufacturer and on areas specified where high-erosion potential may cause undermining and gullies to form beneath the matting.
  - To join two rolls together, cut a trench to anchor the end of the new roll and secure it the same as the top roll. Overlap the end of the previous roll 18 in. over the new roll. Continue to staple as described above.
  - When using excelsior matting, the plastic netting shall be on top of the wood fiber.
  - Erosion stops shall be made of strips of matting placed in narrow trenches 6-12 in. deep that cover the full cross section of the channel. They shall be spaced according to the manufacturer's recommendations or by the following:
    - 3 ft. down the channel from each point of entry of concentrated flow,
    - at points where change in gradient or direction of channel occurs, and
    - on long slopes at spacing from 20-100 ft. depending upon the erodibility of the soil, velocity and volume of flow.
  - Erosion stops shall extend beyond the channel liner to the full design width of the channel, this will check any rills that might form outside or along the edge of the channel lining.
  - Erosion stops shall be constructed with 6 in. deep trench, stapled to the bottom of the trench, backfilled and tamped firmly to conform with the cross section of the channel.
  - If seeding has been done prior to installation of erosion stops, reseed disturbed areas prior to placement of channel liner.

## PERMANENT SEEDING

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### DESCRIPTION

Permanent seeding includes the seedbed preparation, seeding, and the establishment of perennial vegetation used to permanently stabilize soil, prevent sediment pollution, reduce runoff by promoting infiltration, and provide stormwater quality benefits offered by dense vegetation.

### CONDITIONS WHERE PRACTICE APPLIES

Permanent seeding should be applied to:

- Areas or portions of construction-sites which can be brought to final grade. Applications of permanent seeding should not be delayed while construction on limited portions of the site is being completed.
- Areas that will be regraded, but will be dormant for a year or more.

## PLANNING CONSIDERATIONS

Healthy dense turf will have a dramatic long lasting effect on stormwater quality as well as promoting infiltration and reducing the amount of runoff. To establish quality vegetation, careful preparation of the seedbed, soil, even subsoil is highly encouraged.

**Soil Compaction**--Stormwater quality and the amount of runoff both vary significantly with soil compaction. Non-compacted soils improve stormwater by promoting:

- dense vegetation,
- high infiltration & lower runoff rates,
- pollutant filtration, deposition & absorption, and
- beneficial biologic activity in the soil.

Construction activity can cause highly compacted soils but also offers the opportunity to improve soil condition. The best time for improving soil condition is during the establishment of permanent vegetation. It is highly recommended that subsoilers, plows or other implements be specified as part of final seedbed preparation. Use discretion in slip-prone areas.

**Minimum Soil Conditions**--Vegetation cannot be expected to stabilize soil that is unstable due to its texture, structure, water movement or excessively steep slope. The following minimum soil conditions are needed for the establishment and maintenance of a long-lived vegetative cover. If these conditions cannot be met, see the Standards and Specifications for Resoiling.

- Soils must include enough fine-grained material to hold at least a moderate amount of available moisture.
- The soil must be free from material that is toxic or otherwise harmful to plant growth.

Specifications  
for  
**Permanent Seeding**

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### **SITE PREPARATION**

1. A subsoiler, plow or other implement shall be used to reduce soil compaction and allow maximum infiltration. (Maximizing infiltration will help control both runoff rate and water quality.) Subsoiling should be done when the soil moisture is low enough to allow the soil to crack or fracture. Subsoiling shall not be done on slip-prone areas where soil preparation should be limited to what is necessary for establishing vegetation.
2. The site shall be graded as needed to permit the use of conventional equipment for seedbed preparation and seeding.
3. Resoil shall be applied where needed to establish vegetation.

### **SEEDBED PREPARATION**

1. Lime--Agricultural ground limestone shall be applied to acid soil as recommended by a soil test. In lieu of a soil test, lime shall be applied at the rate of 100 lb./1,000 sq. ft. or 2 tons/ac.
2. Fertilizer--Fertilizer shall be applied as recommended by a soil test. In lieu of a soil test, fertilizer shall be applied at a rate of 12 lb./1,000 sq. ft. or 500 lb./ac. of 10-10-10 or 12-12-12 analysis.
3. The lime and fertilizer shall be worked into the soil with a disk harrow, spring-tooth harrow, or other suitable field implement to a depth of 3 in. On sloping land the soil shall be worked on the contour.

### **SEEDING DATES AND SOIL CONDITIONS**

Seeding should be done March 1 to May 31 or Aug 1 to September 30. These seeding dates are ideal but, with the use of additional mulch and irrigation, seedings may be made any time throughout the growing season. Tillage/seedbed preparation should be done when the soil is

dry enough to crumble and not form ribbons when compressed by hand. For winter seeding, see the following section on dormant seeding.

### **DORMANT SEEDINGS.**

1. Seedings shall not be planted from October 1 through November 20. During this period the seeds are likely to germinate but probably will not be able to survive the winter.
2. The following methods may be used for "Dormant Seeding":
  - From October 1 through November 20, prepare the seedbed, add the required amounts of lime and fertilizer, then mulch and anchor. After November 20, and before March 15, broadcast the selected seed mixture. Increase the seeding rates by 50% for this type of seeding.
  - From November 20 through March 15, when soil conditions permit, prepare the seedbed, lime and fertilize, apply the selected seed mixture, mulch and anchor. Increase the seeding rates by 50% for this type of seeding.
  - Apply seed uniformly with a cyclone seeder, drill, cultipacker seeder, or hydro-seeder (slurry may include seed and fertilizer) on a firm, moist seedbed.
  - Where feasible, except when a cultipacker type seeder is used, the seedbed should be firmed following seeding operations with a cultipacker, roller, or light drag. On sloping land, seeding operations should be on the contour where feasible.

## MULCHING

1. Mulch material shall be applied immediately after seeding. Seedings made during optimum seeding dates and with favorable soil conditions and on very flat areas may not need mulch to achieve adequate stabilization. Dormant seeding shall be mulched.

### 2. Materials

- Straw--If straw is used it shall be unrotted small-grain straw applied at the rate of 2 tons/ac. or 90 lb./1,000 sq. ft. (two to three bales). The mulch shall be spread uniformly by hand or mechanically so the soil surface is covered. For uniform distribution of hand-spread mulch, divide area into approximately 1,000-sq.-ft. sections and spread two 45-lb. bales of straw in each section.
- Hydroseeders--If wood cellulose fiber is used, it shall be used at 2,000 lb./ac. or 46 lb./1,000 sq. ft.
- Other--Other acceptable mulches include mulch mattings applied according to manufacturer's recommendations or wood chips applied at 6 tons/ac.

### 3. Straw Mulch Anchoring Methods

Straw mulch shall be anchored immediately to minimize loss by wind or water.

- Mechanical--A disk, crimper, or similar type tool shall be set straight to punch or anchor the mulch material into the soil. Straw mechanically anchored shall not be finely chopped but, generally, be left longer than 6 in.

- Mulch Nettings--Nettings shall be used according to the manufacturer's recommendations. Netting may be necessary to hold mulch in place in areas of concentrated runoff and on critical slopes.

- Asphalt Emulsion--Asphalt shall be applied as recommended by the manufacturer or at the rate of 160 gal./ac.

- Synthetic Binders--Synthetic binders such as Acrylic DLR (Agri-Tac), DCA-70, Petroset, Terra Tack or equal may be used at rates recommended by the manufacturer.

- Wood Cellulose Fiber--Wood cellulose fiber binder shall be applied at a net dry weight of 750 lb./ac. The wood cellulose fiber shall be mixed with water and the mixture shall contain a maximum of 50 lb./100 gal. of wood cellulose fiber.

## IRRIGATION

1. Permanent seeding shall include irrigation to establish vegetation during dry or hot weather or on adverse site conditions as needed for adequate moisture for seed germination and plant growth.

2. Excessive irrigation rates shall be avoided and irrigation monitored to prevent erosion and damage from runoff.

Permanent Seeding			
Seed Mix	Seeding Rate		Notes:
	lb./ac.	lb./1,000ft. <sup>2</sup>	
General Use			
Creeping Red Fescue	20-40	½-1	
Domestic Ryegrass	10-20	¼-½	
Kentucky Bluegrass	10-20	¼-½	
Tall Fescue	40	1	
Dwarf Fescue	40	1	
Steep Banks or Cut Slopes			
Tall Fescue	40	1	
Crown Vetch	10	¼	Do not seed later than August.
Tall Fescue	20	½	
Flat Pea	20	½	Do not seed later than August.
Tall Fescue	20	½	
Road Ditches and Swales			
Tall Fescue	40	1	
Dwarf Fescue	90	2¼	
Kentucky Bluegrass	5		
Lawns			
Kentucky Bluegrass	60	1½	
Perennial Ryegrass	60	1½	
Kentucky Bluegrass	60	1½	For shaded areas
Creeping Red Fescue	60	1½	
Note: Other approved seed species may be substituted.			

Specifications  
for  
**Maintenance of Permanent Seeding**

1. Permanent seeding shall not be considered established for at least 1 full yr. from the time of planting. Seeded areas shall be inspected for failure and vegetation reestablished as needed. Depending on-site conditions, it may be necessary to irrigate, fertilize, overseed, or reestablish plantings in order to provide permanent vegetation for adequate erosion control.
2. Maintenance fertilization rates shall be established by soil test recommendations or by using the rates shown in the following table.

Maintenance for Permanent Seedings Fertilization and Mowing					
Mixture	Formula	lb./ac.	lb./1,000 ft. <sup>2</sup>	Time	Mowing
Creeping Red Fescue Ryegrass Kentucky Bluegrass	10-10-10	500	12	Fall, yearly or as needed.	Not closer than 3"
Tall Fescue	10-10-10	500	12		Not closer than 4"
Dwarf Fescue	10-10-10	500	12		Not closer than 2"
Crown Vetch Fescue	0-20-20	400	10	Spring, yearly following establish- ment and every 4-7 yr. thereafter	Do not mow
Flat Pea Fescue	0-20-20	400	10		Do not mow

Note: Following soil test recommendations is preferred to fertilizer rates shown above.