United States
Department of
Agriculture

Soil
Conservation
Service

Springer Federal Building
301 North Randolph Street
Champaign, Illinois 61820

February 18, 1988

TECHNICAL GUIDE NOTICE IL-80

This notice transmits revised Standard and Specification for Filter Strip.

ACTION REQUIRED

1. Remove the Filter Strip Standard and Specification dated January 1983 in Section IV after Field Windbreak and insert the new Filter Strip Standard and Specification dated February 1988.

2. Pen and ink change the Filter Strip Standard and Specification in the Index of Standards and Specifications to read, "February 1988."

3. Revision addresses use of Filter Strip for CRP. Please read.

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Enclosures

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FILTER STRIP (Acre)

Definition

A strip or area of vegetation for removing sediment, organic matter, and other pollutants from runoff and wastewater.

Scope

This standard establishes the minimum acceptable requirements for design and operation and maintenance of filter strips for removing sediment, organic matter, and other pollutants from runoff or wastewater. It does not apply to field borders (386).

Purpose

To remove sediment and other pollutants from runoff or waste water by filtration, deposition, infiltration, absorption, adsorption, decomposition, and volatilization, thereby reducing pollution and protecting the environment.

Conditions Where Practice Applies

This practice applies: (1) on cropland at the lower edge of fields or on fields adjacent to streams, ponds, and lakes or above conservation practices such as terraces or diversions; (2) in areas requiring filter strips as part of the waste management system to treat polluted runoff or wastewater.

Planning Considerations

Evaluate type and quantity of pollutant, slopes and soils, adapted vegetative species, time of year for proper establishment of vegetation, necessity for irrigation, visual aspects, fire hazards, and other special needs.

Prevent erosion where filters outlet into streams or channels.

If filter strips are to be used in treating wastewater or polluted runoff from concentrated livestock areas, the following must be considered:

1. Adequate soil drainage to insure satisfactory performance.

2. Provisions for preventing continuous or daily discharge of liquid waste unless the area is adequate for infiltrating all daily applied effluent. Temporary storage should be considered to prevent discharge to the filter strip more frequently than once every 3 days.

3. Enough rest periods to maintain an aerobic soil profile. Storage or alternating filter strips may be desirable.

4. Reduced effectiveness of filter strips under snow or frozen conditions.

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5. An adequate filter area and length of flow to provide the desired reduction of pollutants. A serpentine or switchback channel can be used to provide greater length of flow.

6. Provisions for excluding roof water and unpolluted surface runoff.

7. Slopes less than 5 percent are more effective; steeper slopes require a greater area and length of flow.

8. Provisions for mowing and removing vegetation to maintain the effectiveness of the filter area. While not generally recommended, controlled grazing may be satisfactory when the filter area is dry and firm.

9. The need to distribute flow uniformly across the top of the filter strip and maintain sheet flow through the strip.

10. Soils in the filter area have infiltration rates in the range of 1.0 to 6.0 inches per hour. Infiltration rates outside this range require special design.

Filter strips by themselves will not meet the "no-discharge" requirement applicable to livestock operations requiring permits under the National Pollutant Discharge Elimination System. More stringent pollution abatement measures may also be necessary where receiving waters must be highly protected.

The Illinois Environmental Protection Agency has criteria for filter strips. These criteria are identified as "Design and Maintenance Criteria Regarding Runoff Field Application Systems" and are a component of the agency's rules and regulations as promulgated under Title 35: Environmental Protection; Subtitle E: Agriculture Related Water Pollution; Chapter II: Environmental Protection Agency; Part 570.

Design Criteria

I. Filter Strips for Sediment and Related Pollutants.

These criteria apply to filter strips on cropland at the lower edge of fields, on fields, pastures, or manure spreading areas adjacent to streams, ponds, and lakes, and above conservation practices such as terraces or diversions.

A. The length of flow through vigorous vegetation shall be at least 10 ft (2 m) for slopes of less than one percent proportionately up to at least 25 ft (8 m) for 30 percent slopes.

B. Filter strips planted as part of the Conservation Reserve Program (CRP) shall be a minimum of 1 chain (66 feet) wide and a maximum of 1.5 chains (99 feet) wide.

C. CRP filter strips must meet the following criteria:

1. Be planted on land used as cropland.

2. Be planted adjacent to and parallel to streams, natural or artificial, having perennial flow or seasonal flow (flows at least 7 of 10 years during the growing season), or permanent water bodies (lakes and ponds) of 5 acres or more.

3. Must receive overbank flow of runoff and significant sediment from adjacent cropland slopes.

4. Where streams are currently bordered by vegetation (herbaceous or woody) and it is determined the existing vegetation is too narrow, too sparse or too dominated by woody vegetation to significantly reduce the amount of sediment entering the stream or body of water.

II. Filter Strips for Runoff from Concentrated Livestock Areas.

These criteria apply to filter strips for feedlot and barnyard runoff, where facility confines less than or equal to 300 animal units.

A. Settling Facilities. A settling basin shall be provided between the waste source and filter strip to store 1,100 cu. ft. per acre inch of runoff from a 2-year, 24-hour rainfall. Any basin outflow shall be disregarded in computing minimum storage. Additional storage capacity, based on frequency of cleaning, shall be provided for manure and other solids settled within the basin. When the basin will be cleaned after every significant runoff event, additional storage equivalent to at least 0.5 in. from the concentrated waste area shall be provided. If only annual cleaning of the basin is planned, additional storage equivalent to at least 6 in. from the concentrated waste area shall be provided.

B. Effluent Transport System. The transport system between the settling basin and the filter strip shall be designed to keep as uniform of flow as possible to prevent solids depositions. Design velocity should be 2 feet per second or greater. Distribution system should uniformly spread effluent across the top of the filter strip.

C. Filter Strip. The filter strip shall be located on gently sloping soils of moderate permeability with adequate fertility to grow a heavy stand of vegetation. The filter strip shall:

1. Be shaped to provide uniform flow.

2. Have adequate length to provide a minimum contact time of 2 hours. Table 1 gives minimum flow lengths needed to provide a contact time of two hours.

3. Have a minimum width of 20 feet and a maximum width of 100 feet.

4. Provide adequate filter area to infiltrate the runoff from the 1 year 2 hour rainfall event. The following equation shall be used to obtain the minimum filter strip area.

$$\text{Filter strip area} = \frac{\text{volume of runoff (cu ft)} \times 12}{\text{2 hours} \times \text{soil infiltration (in/hr)} - 1.69}$$

Table 1. Minimum Flow Lengths for Vegetative Filters Utilizing Overland Flow and Having Various Slopes [a]

Slope (percent)	Flow Length (ft.)
0.5	300
0.75	375
1.0	425
1.5	525
2.0	600
3.0	750
4.0	850

[a] Design flow depth is 0.5 inch. The assumed Manning's roughness coefficient is 0.3.

FILTER STRIP SPECIFICATIONS

Engineering Specifications

All trees, stumps, brush, rocks, and similar materials that can interfere with installing the filter strip shall be removed. The materials shall be disposed of in a manner that is consistent with standards for maintaining and improving the quality of the environment and with proper functioning of the filter strip.

The filter strip shall be shaped to grade and dimensions shown on the plan or as staked in the field. If necessary, topsoil shall be stockpiled and spread to the required grade and thickness. Excess spoil shall be disposed of in areas where it does not interfere with the required flow characteristics of the filter strip.

Sites for CRP filter strips that have concentrations of water flow shall be graded to assure sheet flow of runoff to the extent possible, or protected from degradation (gullies and ephemeral gullies) with appropriate structural measures and vegetation.

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Vegetative Specifications

1. All areas disturbed during construction shall be vegetated.

2. To aid in the establishment of vegetation, surface water runoff shall be prevented from entering the filter strip through the use of temporary diversions until after vegetation is established to a minimum height of 4 inches and 90 percent ground cover.

3. Immediately prior to seedbed preparation, apply the following minimum amounts of fertilizer per acre (except CRP):

   Nitrogen (N) - 120 pounds of actual nitrogen
   Phosphorus (P) - 120 pounds of P_2O_5
   Potassium (K) - 120 pounds K_2O

4. Apply limestone, if necessary, for the species to be grown.

5. Incorporate the required lime and fertilizer and prepare a firm seedbed to a depth of 3 inches. The seedbed shall be free from clods, stones, or other debris that might hamper proper seeding.

6. Select one of the following mixtures and seed according to the rate shown:

   a. Reed canarygrass - 25 lbs./acre
   b. Mixture reed canarygrass and tall fescue - 15 lbs./acre of each species.

   These mixtures may also be used for CRP.

7. CRP filters strips will be seeded in accordance with Permanent Vegetative Cover specifications. If trees or shrubs are to be planted, do not plant closer than 10 feet from the cropland edge (side away from water) of the filter strip.

Operation and Maintenance

1. Protect the filter from damage by farm equipment, traffic and livestock.

   a. Do not use as a roadway.
   b. Avoid operations that leave tillage marks or wheel marks.
   c. Avoid damaging filter area with herbicides.

2. Fertilize the filter as necessary to maintain vigorous growth.

3. Harvest (except for CRP--see item 8) when the forage is at the proper state of maturity for maximum quality feed. No harvesting shall occur after September 15. Use the following guide for cutting stages and minimum cutting height for the species seeded.

a. Reed canarygrass - cut at early boot state to heading - minimum cutting height 6 inches.

b. Reed canarygrass - tall fescue mixture - cut at early boot to heading - minimum cutting height 6 inches.

4. Repair damage caused by erosion or equipment immediately so it will continue to perform properly.

5. Reshape and reseed areas where concentrated flow occurs or vegetation fails. See Section A, Establishment of Vegetation.

6. To prevent excess organic solids from entering the filter:

   a. Do not scrape waste into settling basin, but place in separate storage area away from settling basin.

   b. Remove solids from the settling basin when 2 to 4 inches accumulate.

7. If organic wastes accumulate in the filter strip and are damaging vegetation, redistribute wastes.

8. Filter strips planted as part of the CRP shall be maintained in a vigorous growing condition by fertilizing and reseeding as necessary. Grazing or removal of the vegetation is not allowed. Mowing, burning, or chemical control of undesirable weeds and wood growth is permitted as long as sufficient planning and care is taken to protect the stand and water quality. Burning is allowed only with an approved plan.