

Natural Resources Conservation Service  
Conservation Practice Standard

**FILTER STRIP**  
**(Ac.)**  
**CODE 393**

**DEFINITION**

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

**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 above conservation practices such as terraces or diversions, or on fields adjacent to streams, ponds, and lakes; (2) in areas requiring filter strips as part of a waste management system to treat polluted runoff or waste water; and (3) on forest land where filter strips are needed as part of a forestry operation to reduce delivery of sediment into waterways.

**CRITERIA**

Filter Strips for Sediment and Related Pollutants. The minimum length of flow through filter strip vegetation (strip width) shall be in accordance with the following table (for CRP purposes, filter strips will be a minimum of 20 feet and a maximum of 99 feet.):

Table 1. Minimum Filter Strip Width 1/

Land Slope	Farming Direction to Filter Strip		
	Perpendicular (90°)	Diagonal (45°)	Parallel (0°)
0-1%	15 ft.	12 ft.	10 ft.
1-3%	20 ft.	17 ft.	15 ft.
3-8%	25 ft.	22 ft.	20 ft.
8-10%	30 ft.	27 ft.	25 ft.

1/ The effectiveness of a filter strip is directly related to: (1) runoff volume (length of row leading to filter strip), (2) density of grass cover, (3) uniformity of shallow flow over strip (absence of concentrated flow). Areas having significant sediment problems shall use a minimum filter strip width of 30 feet.

Filter Strips for Runoff From Concentrated Livestock Areas. These criteria apply to filter strips for feedlot and backyard runoff.

1. A settling basin, vegetated barriers, or low velocity channel shall be provided between the waste source and filter strip when more than 100 1,000-pound animal units are confined. Such facilities should be considered for use with all filter strips.
2. A constructed settling basin, if needed, shall have sufficient capacity, as a minimum, to store the runoff computed for 15 minutes' duration at the peak inflow rate resulting from 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 is cleaned after every significant runoff event, additional storage equivalent to at least 0.5 inch from the concentrated waste area shall be provided. If only annual cleaning of the basin is planned, additional storage equivalent to at least 6 inches from the concentrated waste area shall be provided.

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

3. A low velocity channel shall be a minimum of 75 feet long. It shall be designed for a flow depth of 0.5 foot or less to pass the peak flow resulting from a 2-year, 24-hour rainfall at a velocity of 0.5 foot per second or less (using  $n = 0.06$ ). Provisions shall be provided for removing settled solids from the channel as necessary to maintain proper functioning.
4. A filter strip may be a relatively uniform grass area or grass waterway. Minimum dimensions shall be based on the peak outflow from the concentrated waste area or settling facility based on a 2-year, 24-hour rainfall.
  - a. Grass area filter strips shall be generally on the contour and sufficiently wide to pass the peak flow at a depth of 0.5 in. or less. Flow length shall be sufficient to provide at least 15 minutes of flow-through time.
  - b. Grass channel filter strips shall be designed to carry the peak flow at a depth of 0.5 ft or less. Flow length shall be sufficient to provide at least 30 minutes of flow-through time. Grass species and shape of channel shall be such that grass stems will remain upright during design flow.

Filter Strips for Controlled Overland Flow Treatment of Liquid Wastes. These criteria apply to filter strips for waste water from milk parlors, milking centers, waste treatment lagoon, food processing plants, and animal waste storage facilities.

Overland flow filter strips shall be installed on natural or constructed slopes of 2 to 6 percent. They shall have minimum flow lengths of 100 feet on 2 percent slopes and proportionately up to 300 feet on 6 percent slopes. Weekly waste water application rates should not exceed 6 inches and should be only 1 or 2 inches for highly concentrated wastes. Daily application times should not exceed 6 hours and should be decreased to 2 hours for more concentrated wastes such as that from animal waste storage facilities. Filter strips should be rested at least 2 days each week.

Filter Strips on Forest Land. These criteria apply to filter strips for runoff as part of a forestry operation to reduce delivery of sediment into waterways.

As a guide, the length of flow through undisturbed forest floor should be at least 25 feet for slopes of less than one percent and proportionately up to at least 65 feet for 30 percent slopes and at least 150 feet for 70 percent slopes. As contributing drainage areas increase, longer flow lengths should be used where flow concentration is not a problem.

## CONSIDERATIONS

Siting. 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. Areas and locations of concentrated flow must be minimized and sheet flow promoted to achieve maximum removal of sediment, organic material, and other pollutants from runoff.

Livestock. If filter strips are to be used in treating waste water or polluted runoff from concentrated livestock areas, the following must be considered.

1. Adequate soil drainage to ensure 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 one 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.
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 for a level lip weir, gated pipe, sprinklers, or other facilities to distribute flow uniformly across the top of the filter strip and maintain sheet flow through the strip.

Discharge. 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.

#### Water quantity

- Filter strips may have only a minor effect on the quantity of surface and ground water.
- Effects of vegetation and on soil moisture and water retention within the filter strip.

#### Water quality

- Effects on the nutrient budget within the filter strip as related to removal, residence, or accumulation of nutrients. Nutrient budgets should account for effects of growing and decaying vegetation.
- Filtering effects of vegetation on movement of sediment, pathogens, organic loads, and dissolved and sediment-attached substances.

- Effects of the filter strips vegetation's uptake of nutrients on surface and ground water.
- Effects of the timing of the vegetation's management, including clipping, harvesting, removal and re-establishment on the nutrient balance within the filter strip.
- Effects on the visual quality of onsite and downstream water resources.

### **PLANS AND SPECIFICATIONS**

Plans for installing filter strips shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

Specifications for construction and installation of a filter strip shall use or be in conformance with the requirements of the attached "Construction Specifications." Any variation from these specifications shall be approved by an engineer.

### **OPERATION AND MAINTENANCE**

Development of rills and small channels within filter areas must be minimized. Needed repairs must be made immediately to reestablish sheet flow and to minimize the pollution potential to downstream areas. A shallow furrow on the contour across the filter can be used to reestablish sheet flow. Vegetation must be maintained in a vigorous condition. If livestock have access to the filter area, it must be fenced to control grazing.

## Natural Resources Conservation Service Construction Specifications

### FILTER STRIP

#### 1. SCOPE

Work shall consist of constructing the filter strip to width, depth, and length shown on the drawings and at the location shown on the drawings or as staked in the field.

#### 2. SITE PREPARATION

All trees, stumps, brush, rocks, and similar materials that can interfere with installation and maintenance of 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.

#### 3. DIMENSIONS OF INSTALLATION

Filter strips shall be constructed to equal or exceed the widths and dimensions shown on the drawings or as staked in the field. Filter strips for liquid wastes or runoff from concentrated livestock areas shall be constructed within  $\pm 0.2$  foot of design grade and have a positive slope in the downstream direction.

#### 4. MATERIAL

Topsoil shall be stockpiled, as needed, and spread during the final shaping and grading to promote vegetative growth.

Excess spoil shall be disposed of in areas where it does not interfere with the required flow characteristics of the filter strip.

#### 5. VEGETATION

Prepare the filter strip seedbed with at least two (2) diskings and incorporate fertilizer and lime in the top four or more inches of soil. Prepare the seedbed and smooth it in advance of planting to allow soil to become well settled and firm before planting or use a cultipacker to firm the fresh seedbed before and after planting.

Vegetation used to filter liquid wastes or runoff from concentrated livestock areas should be established before wastes or runoff are applied.

#### 6. MEASUREMENT

At least one (1) representative section will be made to determine that the designed width or cross section dimensions have been obtained.

Measurement for vegetative planting area will cover all disturbed areas (filter strip, disposal area) that are not to be cultivated. Areas will be measured to the nearest 0.1 acre.

#### 7. VEGETATION DETAILS

Seeding Date: \_\_\_\_\_

Seed Type: \_\_\_\_\_

Seed Rate: \_\_\_\_\_

Seeding rates and specifications should be for pasture planting.

Suggested Plant List (other plants may be used with approval of an agronomist)

Grasses:

Bahiagrass

Bermudagrass (common or hybrid)

Tall Fescue (fungus infected)

Legumes (in combination with grass):

White Clover

Red Clover

Crimson Clover

Annual Lespedeza

Soil Preparation: \_\_\_\_\_

Fertilizer: \_\_\_\_\_, Rate \_\_\_\_\_ #/acre

Lime: \_\_\_\_\_, Rate \_\_\_\_\_ #/acre

Mulch: \_\_\_\_\_, Rate \_\_\_\_\_ #/acre

Other \_\_\_\_\_: \_\_\_\_\_

#### 8. CONSTRUCTION DETAILS

---



---



---

