

NATURAL RESOURCES CONSERVATION SERVICE  
MONTANA CONSERVATION PRACTICE SPECIFICATION

## FILTER STRIP (ACRE)

### CODE 393

**DEFINITION:** A strip or area of herbaceous vegetation that removes contaminants from overland flow.

**PURPOSE:**

- Reduce suspended solids and associated contaminants in runoff.
- Reduce dissolved contaminant loadings in runoff.
- Reduce suspended solids and associated contaminants in irrigation tail water.

**WHERE USED:** Filter strips are established where environmentally-sensitive areas need to be protected from sediment, other suspended solids and dissolved contaminants in runoff. In many cases, filter strips by themselves may not eliminate runoff and their associated contaminants.

**CONSERVATION MANAGEMENT SYSTEM:** Filter strips are normally established as part of a conservation management system to address the soil, water, air, plant, animal, and human needs as related to the owner's goals and objectives. It is important to consider conservation crop rotation, nutrient and pest management, crop residue management, agricultural waste utilization, and other supportive conservation practices, when designing a filter strip. Filter strips can also provide forage production and improve farm aesthetics. They are most effective in providing conservation benefits when used in combination with other agronomic or structural practices.

**WILDLIFE:** Filter strips can enhance wildlife objectives depending on the vegetative species used and management practiced. Consider using species that can provide food and cover for important wildlife. Delay mowing of filter area until after nesting season.

**DESIGN SPECIFICATIONS:** Overland flow entering the filter strip shall be a uniform sheet flow. Concentrated flow shall be dispersed before it enters the filter strip. The maximum gradient at the leading edge (perpendicular to water flow) of the filter strip shall not exceed 10% (one-half of the up-and-down hill slope percent, immediately upslope from the filter strip, up to a maximum of 5%).

Montana-listed noxious plants will not be allowed in the filter strip. A list of Montana's noxious weeds can be found at [http://www.weedawareness.org/weed\\_list.html](http://www.weedawareness.org/weed_list.html). Filter strips shall not be used as a travel lane for equipment or livestock.

Filter strips will be established to sod-forming species, or a combination of sod-forming and bunch forming vegetation. Bunch-forming species are limited to 15% Pure Live Seed (PLS) of the total mixture.

#### **To Reduce Suspended Solids and Associated Contaminants in Runoff**

In addition to the design specifications listed above, the filter strip will be designed to have a 10-year life span, following the procedure in the Agronomy Technical Note No. 2 (Using RUSLE2 for the Design and Predicted Effectiveness of Vegetative Filter Strips (VFS) for Sediment), based on the sediment delivery in RUSLE2 to the upper edge of the filter strip and ratio of the filter strip flow length to the length of the flow path from the contributing area. (National Agronomy Technical Note No. 2 can be found at <http://directives.sc.egov.usda.gov> then select Technical Notes, Ecological Sciences, then Agronomy). The minimum flow length through the filter strip shall be 20 feet. The filter strip shall be located immediately down slope from the source area of contaminants.

## **Specification MT393-2**

The drainage area above the filter strip shall have a minimum slope of 1%.

**Vegetation.** The filter strip shall be established to permanent herbaceous vegetation.

Species selected shall be:

- able to withstand partial burial from sediment deposition and
- tolerant of herbicides used on the area that contributes runoff to the filter strip.

Species selected shall have stiff stems and a high stem density near the ground surface.

Species selected for seeding or planting shall be suited to current site conditions and intended uses. Selected species will have the capacity to achieve adequate density and vigor within an appropriate period to stabilize the site sufficiently to permit suited uses with ordinary management activities.

Species, rates of seeding or planting, minimum quality of planting stock, such as PLS or stem caliper, and method of establishment shall be specified before application based upon [Plant Materials Technical Note Number MT-58, Seedbed Preparation and Seeding](#). Only viable, high quality seed or planting stock will be used. Bunch-forming species are limited to 15% PLS of the mixture.

Site preparation and seeding or planting shall be done at a time and in a manner that best ensures survival and growth of the selected species. Successful establishment of a filter strip is 10 plants per square foot measured the first year of establishment.

Planting dates shall be scheduled during periods when soil moisture is adequate for germination and/or establishment.

The minimum seeding and stem density shall be equivalent to a high quality grass hay seeding rate for the climate area or the density of vegetation selected in RUSLE2 to determine trapping efficiency, whichever is the higher seeding rate.

Where fast establishment of cover is important, annual ryegrass or spring-seeded small grain crops may be used to ensure adequate protection the first year of establishment. With the exception of spring-seeded winter wheat, small grain crops should be terminated prior to seed-head formation.

### **To Reduce Dissolved Contaminants in Runoff**

In addition to the above listed "general criteria" and the criteria for "reducing suspended solids and associated contaminants in runoff," the minimum flow length (perpendicular to water flow) shall be 30 feet.

### **To Reduce Suspended Solids and Associated Contaminants in Irrigation Tailwater**

Filter strip vegetation shall be a small grain or other suitable annual plant that has a high percentage of seed germination and low dormant seed count. The seeding rate shall be sufficient to ensure that the plant spacing does not exceed 3 inches.

Filter strips shall be established early enough prior to the irrigation season so that the vegetation is mature enough to filter sediment from the first irrigation.

The minimum flow length for this purpose shall be 20 feet. Where excess sediment builds up at the leading edge of the filter strip, removal is required to ensure sheet flow across the strip.

Where furrow irrigation is utilized, the furrow will not extend through the filter strip but will terminate at the leading edge of the strip where water will be allowed to flow as a sheet flow across the strip.

With the exception of spring-seeded winter wheat, vegetation must be clipped or the growing plant terminated prior to seed-head formation.

Table 1. Grass Species Characteristics and Adaptability.

Species	Moisure Range of Adaptability (inches)	Soil Protection and Cover <sup>1/</sup>		
		Riparian Areas	Critical Areas	Nitrogen Uptake <sup>2/</sup>
Bromegrass, Smooth	12+	Y	Y	H
Bromegrass, Mountain	14-20	N	Y	M
Canarygrass, Reed	15+	Y	N	H
Foxtail, Creeping	18+	Y	N	H
Needlegrass, Green	12-18	N	Y	L
Orchardgrass	15+	N	Y	M
Timothy	15+	N	Y	M
Wheatgrass, Crested	10-18	N	Y	H
Wheatgrass, Intermediate	13-22	N	Y	H
Wheatgrass, Pubescent	12-20	N	Y	H
Wheatgrass, Siberian	10-18	N	Y	L
Wheatgrass, Slender	12-20	N	Y	M
Wheatgrass, Thickspike	10-18	Y	Y	L
Wheatgrass, Streambank	8-18	Y	Y	L
Alfalfa	12+	N	Y	M
Clover, Alsike	16+	N	Y	M
Clover, Ladino	16+	N	Y	M
Clover, White	14+	N	Y	M
Sweetclover	10+	N	Y	L
Trefoil, Birdsfoot	14+	N	Y	L
Milkvetch, Cicer	14+	N	Y	M
Fescue, Hard	14-20	N	Y	M
Grama, Blue	10-18	N	Y	L
Ricegrass, Indian	10-18	N	Y	L
Needle and Thread	10-18	N	Y	L
Saltgrass, Inland	15+	Y	Y	L

<sup>1/</sup> Y = well adapted; N = not adapted.

<sup>2/</sup> uptake potential is based on relative N, use efficiency assuming adequate moisture is available for plant growth. (L) low uptake, (M) moderate uptake, (H) high uptake.

**OPERATION AND MAINTENANCE:**

Permanent filter strips shall be harvested (excess vegetation removed) as appropriate to encourage dense growth, maintain upright growth habit and remove nutrients and other contaminants in the plant tissue. With the exception of spring-seeded winter wheat, vegetation must be clipped or terminated prior to seed-head formation. Control all undesirable weeds including noxious and nuisance weeds.

#### **Specification MT393-4**

When excess sediment builds up at the leading edge of the filter strip, removal is required to ensure sheet flow across the strip.

If prescribed burning is used to manage and maintain the filter strip, an approved burn plan must be developed. To best serve wildlife, the filter strip should not be burned or mowed during the nesting season.

Inspect the filter strip after storm events and repair any gullies that have formed, remove unevenly deposited sediment accumulation that will disrupt sheet flow, re-seed disturbed areas and take other measures to prevent concentrated flow through the filter strip.

Apply supplemental nutrients as needed to maintain the desired species composition and stand density of the filter strip.

Periodically re-grade and re-establish the filter strip area when sediment deposition at the filter strip-field interface jeopardizes its function. Re-establish the filter strip vegetation in these re-graded areas, if needed.

If grazing is used to harvest vegetation from the filter strip, the grazing plan must insure that the integrity and function of the filter strip is not adversely affected.