

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**CONTOUR BUFFER STRIPS**

(Acre)

**CODE 332**

**DEFINITION**

Narrow strips of perennial, herbaceous vegetative cover established across the slope and alternated down the slope with wider cropped strips.

**PURPOSES**

This practice may be applied as part of a conservation management system:

1. To reduce sheet and rill erosion.
2. To reduce transport of sediment and other water-borne contaminants downslope, on-site or off-site.
3. To enhance upland wildlife habitat.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies on cropland to reduce sheet and rill erosion and sediment yield, and to enhance wildlife habitat. It is most suitable on uniform slopes with slope lengths less than the Critical Slope Length (Critical Slope Length is the length of slope above which contouring loses its effectiveness.)

The narrow strips of permanent vegetative cover are not a part of the normal crop rotation.

This standard does not apply to situations where the width of the buffer strips will be equal to or exceed the width of the adjoining crop strips.

The practice is more difficult to establish

on undulating to rolling topography because of the difficulty of maintaining parallel strip boundaries across the hill slope or staying within row grade limits.

**CRITERIA**

**General Criteria Applicable To All Purposes.**

***NOTE:*** *Specific program guidance may be more restrictive on a number of these criteria. Refer to program manual for specific program requirements.*

**a. Critical Slope Length Limits:**

The critical slope length limits for the contour buffer strip system is 1.5 times the critical slope length limits as determined for contour farming under RUSLE2.

**b. Vegetation:**

Use permanent grasses, legumes, or grass legume mixtures adapted to the site, and tolerant of the anticipated depth of sediment deposition. Plants designated as noxious weed by the state or county will not be established in a buffer strip cropping system.

Develop contour buffer strip seed mixtures from the Conservation Cover standard ([327](#)).

The buffer strips shall have a Vegetative Cover-Management Condition of 1 or 2 that provides protective cover and induces sediment deposition during periods when erosion is expected to occur on the cropped strips.

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

Cropped strips will normally be expected to have a Cover-Management Condition 3 through 7. (Cover Management Conditions are described in Field Office Technical Guide, Section I - Erosion Prediction, Revised Universal Soil Loss Equation (RUSLE), Table 1 or in Chapter 6, Predicting Soil Erosion by Water, A Guide to Conservation Planning with the Revised Universal Soil Loss Equation).

**c. Headlands or End Rows:**

On fields where row crops are a part of the rotation, establish and maintain field borders in perennial herbaceous vegetative cover when concentrated water flows will develop or where up and down hill farming of end rows will result in a soil loss exceeding tolerable soil loss levels. Field borders shall be sufficient width to accommodate turning farm equipment without additional end rows.

**d. Grass/Legume Strip Width:**

The following options may be used to calculate buffer strip width:

- Use direct percent of the length of slope as defined in the Revised Universal Soil Loss Equation version 2 (RUSLE2) or the current erosion control prediction model. The maximum benefits with regards to the P factor in RUSLE2 are achieved when buffer widths equal 20 percent of slope length.
- When the cultivated crop width needs are determined, you can use the following formula to calculate the design width of the buffer strip.

$$SW = \frac{(PSW)(CS)}{1 - (PSW)}$$

Where:

SW = buffer strip width

PSW = Percent of the combined width of the cultivated and buffer strip devoted to only the buffer strip expressed as a decimal. For example, a system required 20% would equal .20.

CS = cultivated strip width.

**Additional Criteria to Reduce Sheet and Rill Erosion.**

**a. Row Grade, Strip Boundaries, and Baselines:**

The grade of the cropped strip shall be aligned as closely as possible to the contour to achieve the greatest erosion reduction possible. The maximum grade of rows within the crop strips shall not exceed one-half of the up and down hill field slope or two percent, whichever is less.

For crops sensitive to ponded water for periods less than 48 hours, design a positive row grade of not less than 0.5 percent from the nose of a hill or ridge toward a stable outlet.

Up to three percent row grade is allowed for a maximum of 150 feet as crop rows approach a stable outlet.

When the grade of any crop strip reaches the maximum allowable design grade, a new base line shall be established up or down slope from the last buffer strip and used for the layout of the next crop strip.

**b. Stable Outlets:**

Surface flow from contoured crop rows must go to a stable outlet. Stable outlets include grassed waterways, underground outlets for terraces or diversions, water and sediment control basins, field borders, headlands or end rows, or similarly stabilized areas.

**c. Arrangement of Strips:**

Cropped strips shall be alternated with buffer strips down the hill slope. Normally, a crop strip will occupy the area at the top of the hill.

**d. Width of Strips:**

Varying buffer strip widths may be necessary to keep either a cropped strip adjacent to it of uniform width or to maintain the strip boundary grades within the criteria set above. Width of buffer strips at their narrowest point shall be no

less than 15 feet for grasses or grass legume mixtures and no less than 30 feet when legumes are used alone.

Cropped strip widths shall not exceed 50 percent of either the slope length (L), used for erosion calculation, or the critical slope length limits for strip cropping, whichever is least, determined by using the approved erosion prediction technology.

**e. Level of Erosion Control:**

The level of erosion control achieved by the buffer strip cropping standard shall meet or exceed the soil erosion level specified by the conservation plan objective. It shall be determined using RUSLE2 or most current erosion prediction technology, accounting for the impact of other conservation practices in the system.

**Additional Criteria to Reduce the Transport of Sediment and Other Water-Borne Contaminants Downslope.**

**a. Vegetation:**

Buffer strips shall be established using permanent grass vegetation.

**b. Width of Strips:**

On sloping cropland exceeding three percent, the design shall be based on the minimum criteria given above to reduce sheet and rill erosion. On slopes three percent or flatter, the width of the buffer strip shall be 15 feet or wider.

The maximum width between buffer strips shall be 100 feet or 1/2 half of the field slope length, which ever is smaller. This width may be adjusted to account for equipment width.

**c. Arrangement of strips:**

Where a buffer strip is established adjacent to intermittent or perennial streams, the width of this buffer strip may be two times the width of the other buffer strips in the system.

**Additional Criteria to Enhance Wildlife Habitat.**

**a. Vegetation:**

Refer to practice standard Upland Wildlife Habitat Management (645) or Conservation Cover (327) for recommended species and seeding mixtures.

**b. Strip Width:**

The minimum acceptable width of buffer strips designed to enhance wildlife habitat shall be 30 feet or wider as determined based on the requirements for nesting and escape cover of the target wildlife species.

**CONSIDERATIONS**

This practice is most effective on flatter slopes but can reduce sheet and rill erosion on steeper slopes. Effectiveness of this practice is a function of soil texture, land slope, effective ridge height, and cover-management condition.

Protect areas of existing or potential concentrated flow erosion by any one or more suitable conservation practices, such as grassed waterways, water and sediment control basins, or diversion terraces.

Design and install the strip layout to best facilitate operation of all machinery used on the strips. Lay out strips to have some multiple of full implement widths used for the farming operation.

Prior to design and layout, consider removing any obstructions or making changes in field boundaries or shape, where feasible, to improve the effectiveness of the practice and the ease of performing farming operations.

Prior to layout, inspect the field's position on the landscape to find key points for commencing layout or getting the width of one set of strips (one cultivated and one buffer) to pass by an obstruction or ridge saddle. Whenever possible to stay within grade limits, run strip boundary parallel with fence lines or other barriers. Account

for uncropped access road widths when they must traverse the field by adjusting strip boundaries on either side accordingly.

To enhance wildlife habitat, mow the buffer strips every third year. The residual cover provides early and late season nesting and escape cover for many species of wildlife displaced from other mowed areas. Mow after August 1 to allow for nesting birds to complete the nesting season.

Some non-noxious weedy growth may be allowed in the strips as they provide an insect source for young birds. Also, consider adding native forbs to the seeding mixture when they are available.

The use of dense, stiff stemmed grass will provide for better sediment trapping.

### **PLANS AND SPECIFICATIONS**

Specifications for installation, operation, and maintenance of Contour Buffer Strips shall be prepared for each field according to the Criteria, Considerations, and Operations and Maintenance described in this standard, and shall be recorded on specification sheets, job sheets, narrative statements in conservation plans, or other acceptable documentation.

The following components shall be included for recording this specification:

- Aerial photo or map with field identified
- Contour buffer marked on map
- Width of contour buffer
- CPA-4 seeding recommendation
- RUSLE2 documentation

### **OPERATION AND MAINTENANCE**

Conduct all farming operations parallel to the strip boundaries except on headlands or end rows with gradients less than the criteria set forth in this standard.

Time mowing of buffer strips to maintain appropriate vegetative density and height for optimum trapping of sediment from the upslope cropped strip during the critical erosion period(s). Delay mowing until after ground-nesting birds have hatched, usually after August 1.

Fertilize buffer strips as needed to maintain stand density.

Where contour row curvature becomes too sharp to keep equipment aligned with rows during field operations, establish sod turn strips on sharp ridge points. In drainageways, establish grassed waterways at least to the point of sharp curvature. These strips shall be wide enough to allow the equipment to be lifted and/or turned and meet the same rows across the turn strip.

Spot seed or renovate buffer strips that are damaged by herbicide application after residual action of the herbicide is complete.

The grass strips of a contour buffer strip system should be rotated to prevent excess sediment accumulations in the grass areas.

Cultivated strips and buffer strips shall be rotated so that a mature stand of protective cover is achieved in a newly established buffer strip immediately below or above the old buffer strip before removing the old buffer to plant an erosion-prone crop. Alternate repositioning of buffer strips to maintain their relative position on the hill slope.

Renovate vegetated headlands or end row area as needed to keep ground cover above 65 percent. Renovation shall only include the immediate seedbed preparation and reseeding to a sod-forming crop with or without a nurse crop. Maintain full headland or end row width to allow farm implements room to double back on the same strip.

## REFERENCES

The following publications are available at the local NRCS field offices or the Iowa NRCS Home page at: <http://www.ia.nrcs.usda.gov>.

- Field Office Technical Guide Standards
  - a. [Upland Wildlife Habitat Management, \(645\)](#)
  - b. [Conservation Cover, \(327\)](#)
- Predicting Soil Erosion by Water: A Guide to Conservation Planning with the Revised Universal Soil Loss Equation (RUSLE), Agricultural Handbook Number 703.
- Revised Universal Soil Loss Equation Version 2 (RUSLE2) website: [http://fargo.nserl.purdue.edu/rusle2\\_dataweb/RUSLE2\\_Index.htm](http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm)