

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

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

1. This practice applies on cropland. It is most suitable on uniform slopes ranging from 4 to 8 percent with slope lengths \leq the Critical Slope Length (Critical Slope Length = length of slope above which the practice loses its effectiveness). It is also most suitable in regions where rainfall intensities are low to moderate (10 year EI less than 140). EI = storm energy * intensity.
2. This practice is not suited to fields with extremely long slopes whose length exceeds the critical slope length for contouring by more than 1.5 times, unless the field slope length is shortened by the installation of other practices (e.g. diversions or terraces).
3. 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.
4. The narrow strips of permanent vegetative cover are not a part of the normal crop rotation.
5. 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.

CRITERIA

General Criteria Applicable to All Purposes

No plants listed on the noxious weed list of the state will be established in a buffer strip cropping system.

Additional Criteria To Reduce Sheet and Rill Erosion

1. Row Grade, Strip Boundaries, and Baselines

- a. 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 1/2 of the up and down hill field slope or 2 percent, whichever is less.
- b. 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 3 percent row grade is allowed for a maximum of 150 feet as crop rows approach a stable outlet.
- c. The row grade along the up slope side of the vegetative buffer shall be the same as for the cropped strip directly above it.
- d. 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.

2. 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.

3. Arrangement of Strips

- a. 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.
- b. When used in combination with terraces, the layout of buffer strips shall be coordinated with the grade and spacing of the terraces so that strip boundaries will parallel terraces/diversions wherever possible. The terrace channel shall occupy the buffer strip location or lie immediately below the last buffer strip.

4. Width of Buffer Strips

The buffer strips shall be of equal width, except when a varying width buffer strip is needed 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.

5. Cropped Strip Widths

Cropped strip widths shall be of uniform width between buffer strips and not exceed 50 percent of either the slope length (L), used for erosion calculation, or the Maximum Cropped Strip width shown in Table 1, **whichever is least**, as determined by using the approved erosion prediction technology (Section I, FOTG). **In most cases the 1/2 the slope length will be the limiting factor to determine crop strip width.** SPECIAL NOTE - for slope lengths exceeding 300 feet, the width may be up to 1.5 times the critical slope as calculated using the RUSLE procedure, Section I, FOTG.

A maximum of 15% deviation of the maximum cropped strip width is allowed to accommodate equipment widths.

Table 1. Maximum Cropped Strip Width (feet)

Land Slope	Hydrologic Soil Groups			
	A	B	C	D
1 – 4 %	300	230	200	190
5 – 6 %	200	180	150	120
7 – 8 %	130	110	100	90
9 – 10 %	110	90	80	70

6. Vegetation

- a. Vegetation grown on buffer strips shall consist of permanent grasses, legumes, or grass-legume mixtures, adapted to the site, and tolerant of the anticipated depth of sediment deposition.
- b. 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. Cropped strips will normally be expected to have a Cover-Management Condition 3 through 7. (Cover Management Conditions are described in Section 1, FOTG - Revised Universal Soil Loss Equation "RUSLE").
- c. The stem density for grass species shall be greater than 50, and for legumes, greater than 30 per square foot.
- d. The buffer strip may be established using any of the seeding mixtures in Section IV, FOTG, Appendix A, Table 3 that fit the site conditions and the intended use of the buffer cover.

7. Critical Slope Length

The critical slope length for buffer strip cropping is 1.5 times the critical slope length determined for contour farming as determined using approved erosion prediction technology.

8. Headlands or End Rows

On fields where row crops are a part of the rotation, keep headlands or end rows in permanent sod if their row grade would be steeper than the designed grade of the crop strip.

9. 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 approved erosion prediction technology, accounting for the impact of other conservation practices in the system.

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

1. Vegetation

Buffer strips shall be established using permanent grass vegetation using any of the grass seeding mixtures in Section IV, FOTG, Appendix A, Table 3 that fit the site conditions and the intended use of the buffer cover.

2. Width of Strips

- a. On sloping cropland exceeding 3 percent, the design shall be based on the minimum criteria given above to reduce sheet and rill erosion. On slopes 3 percent or flatter, the width of the buffer strip shall be 15 feet or wider.
- b. 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 up to 15% to account for equipment width.

3. Arrangement of strips

Buffer strips and crop strips will be alternated down the hill slope. A buffer strip will be established at the bottom of the slope. This width of this buffer strip will be two times the width of the other buffer strips in the system.

4. Headlands or End Rows

Headlands or end rows shall be vegetated and have a minimum width of 15 feet between the end of the tilled strip and the field's edge.

Additional Criteria to Enhance Wildlife Habitat

1. Vegetation

Use permanent wildlife grasses, legumes, or grass-legume mixtures, adapted to the site using any of the seeding mixtures in Section IV, Appendix A, FOTG. Haying and mowing operations shall not occur between spring and July 15th to protect nesting birds.

2. Strip Width

- a. 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.
- b. On cropland exceeding 3 percent slope, the design width of buffer strips shall exceed 30 feet when a wider strip is needed to achieve acceptable sheet and rill erosion rates.

- c. The maximum width between buffer strips shall not exceed 300 feet.

CONSIDERATIONS

1. 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.
2. Design and install the strip layout to best facilitate operation of all machinery used on the strips.
3. Whenever possible, lay out strips to have some multiple of full implement widths used for the farming operation.
4. 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.
5. 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.
6. When the slope length exceeds the critical slope length for the cover-management condition that best characterizes the field to be contour buffer stripped, establish structures, such as diversions, to reduce the slope length below critical if the soil loss objective is not reached.
7. Critical slope lengths can be increased by retaining crop residue on the soil surface of the cultivated strips using crop residue management practices. Certain tillage practices can also be used on the cultivated strips to increase random roughness to cause deposition to occur in depressions between soil clods. However, if the cropped strips are kept very rough, in high ridges, or under heavy residue cover, the need for contour buffer strips as an erosion and sediment reduction practice will be reduced since less sediment will be delivered to them.
8. To enhance wildlife habitat, mow the buffer strips every other year or every third year depending upon geographical location. The residual cover provides early and late season nesting and escape cover for many species of wildlife displaced from other mowed areas. Mow in mid to late July to allow for regrowth before the growing season ends.
9. Some 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.

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. See the "Practice Documentation" sheet at the end of this standard for minimum documentation requirements.

OPERATION AND MAINTENANCE

1. 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.
2. 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).
3. Delay mowing until after ground nesting birds have hatched, usually after July 15.
4. Fertilize buffer strips as needed to maintain stand density.
5. 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.
6. Mow sod turn strips and waterways at least annually.
7. Spot seed or totally renovate buffer strip systems damaged by herbicide application after residual action of the herbicide is complete.
8. Redistribute sediment accumulations along the upslope edge of the buffer-crop strip interface upslope over the cultivated strip when needed to maintain uniform sheet flow along the buffer/cropped strip boundary. If sediment accumulates just below the upslope edge of the buffer strip to a depth of 6 inches or vegetative ground cover falls below 65 percent in the buffer strip, relocate the buffer/cropped strip interface location. 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.
9. 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:

National Standard Contour Buffer Strips (332) dated March 1999
National Jobsheet 332
Agricultural Handbook Number 703
Appendix A, Grass and Legume Seeding Tables, Section IV, Ohio FOTG

Practice Documentation For: <i>Contour Buffer Strips - 332</i>
The following documentation must be in the case folder or engineering subfolder.
Practice Planning
<ol style="list-style-type: none"> 1. Is the practice part of a conservation plan? 2. Have the purpose(s) for the practice been identified? 3. Is the location of the practice identified on a map or plan drawing?
Practice Design
<p>Have the following design criteria been addressed?</p> <ol style="list-style-type: none"> 1. Buffer strip widths and lengths (planned acres). 2. Spacing of the buffer strips. 3. Type (species) of buffer strip. 4. Seeding rates, times, and methods. 5. Fertilization requirements.
Practice Installation / Application
Does the practice meet the minimum criteria for the planned purpose(s)?
<p>Have the following criteria been documented in the assistance notes or practice jobsheet?</p> <ol style="list-style-type: none"> 1. Strip widths and lengths established (applied acres). 2. Spacing of the buffers. 3. Quality of the seeding.
Practice Deficiencies
If applicable, have the practice deficiencies been communicated with the decisionmaker?
Practice Maintenance
<p>Have the following maintenance actions been communicated to the decisionmaker?</p> <ol style="list-style-type: none"> 1. Mowing or harvest schedule with cutting heights to maintain the intended purpose of the buffer. 2. Fertilization of the buffer strips. 3. Spot treatment and renovation procedures for damaged areas. 4. Redistribution of sediment deposits to maintain buffer functions.
Other Comments: