

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

CONTOUR BUFFER STRIPS

(Acre)

Code 332

DEFINITION

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

PURPOSES

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

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to cropland. It is most suitable on uniform slopes ranging from 4 to 8 percent with slope lengths less than the Critical Slope Length (Critical Slope Length = length of slope above which contouring loses its effectiveness). 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. terraces).

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.

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. If this is desired or needed for erosion control, use

the *Stripcropping, Contour* practice standards and specifications.

CRITERIA

Criteria Applicable to Both Reducing Sheet and Rill Erosion and Reducing Transport of Sediment and Water-Borne Contaminants.

Row Grade, Strip Boundaries, and Guidelines

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 row guidelines within the cropped strips shall not exceed one half of the up and down hill field slope or 2 percent, whichever is less. Up to 3 percent row grade is allowed for a maximum of 150 feet as crop rows approach a stable outlet.

Row grades for soils included in hydrologic groups C or D or for crops sensitive to less than 48 hours ponded water, shall be designed with positive row drainage of not less than 0.5 percent. The grade along the up slope side of the vegetated buffer shall be the same as for the cropped strip directly above it.

When the grade of any cropped strip reaches the lesser of 4% or ½ the field slope, a new guideline shall be established up or down slope from the last buffer strip and used for the layout of the next crop strip.

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.

When used in combination with terraces with underground outlets, diversions, or water and sediment control basins, the layout of buffer

strips shall be coordinated with the grade and spacing of the terraces so that strip boundaries will parallel terraces wherever possible. The buffer strip shall occupy the terrace or diversion channel, a channel leading to a water and sediment control basin, or lie immediately up slope of the terrace or diversion channel.

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.

Additional Criteria to Reduce Sheet and Rill Erosion

Width of 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. In no case shall a contoured buffer strip be as wide or wider than the cropped strip.

Cropped strips shall be of uniform width between buffer strips and not exceed the lesser of:

- (1) 50 percent of the slope length (L), used for the erosion calculation, or
- (2) 50 percent of the critical slope length for contour buffer strips. The critical slope length for contour buffer strips is calculated by multiplying 1.5 times the critical slope length for contour farming as determined by using the Revised Universal Soil Loss Equation (RUSLE).

Cropped strip width shall be designed to account for some multiple of full equipment width.

Vegetation

Vegetation grown on buffer strips designed to reduce sheet and rill erosion shall be established to permanent vegetation consisting of grasses,

legumes, or grass-legume mixtures, adapted to the site, and tolerant of the anticipated depth of sediment deposition. No plants listed on the noxious weed list of the state will be established in a buffer strip cropping system.

The buffer strips shall have a Vegetative Cover-Management Condition of 1 (established meadow - very dense cover) or 2 (1st year meadow or grass legume hay just before cutting) 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 within the range from 3 (heavy dense cover or very rough) through 7 (Clean tilled, smooth or fallow). (Cover Management Conditions are described in Chapter 6, Predicting Soil Erosion by Water, A Guide to Conservation Planning with the Revised Universal soil Loss Equation "RUSLE") and **Appendix 1** of this standard.

The stem density for grass species shall be greater than 50, and for legumes, greater than 30 stems per square foot.

Level of Erosion control

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

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.

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

Vegetation

Buffer strips designed to reduce the transport of sediment and other water-borne contaminants shall be established to permanent sod forming vegetation with stiff, upright stems only. No plants listed on the noxious weed list of Illinois

will be established in a buffer strip cropping system. Volunteer noxious weeds will be controlled using approved methods.

Width of Strips

On cropland having slopes exceeding 3 percent, the buffer strip width 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.

The maximum width of cropped strips between buffer strips shall be one half of the field slope length not to exceed 150 feet. Cropped strip width shall be designed to account for some multiple of full equipment width.

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.

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

To enhance wildlife habitat, native, warm season grass specie mixture, recommended for wildlife purposes, will be used where adapted.

Delay mowing the buffer strips to every other year or every third year depending upon geographical location.

Mow only after the desired species of ground nesting birds have hatched. Allow for regrowth before the growing season ends.

To enhance wildlife cover, the width of buffer strips will be increased to 30 feet or wider as determined based on the requirements for nesting and escape cover of the target wildlife species.

The maximum width between buffer strips should not exceed 300 feet.

CONSIDERATIONS

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.

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 terraces, to reduce the slope length below critical if the soil loss objective is not reached. (Design Guidance: Critical slope lengths increase when crop residue is left on the soil surface of the cultivated strips. 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. Consequently, RUSLE "P" Factor values will be approximately 1 when these conditions are present.

On fields where row crops are a part of the rotation, consider establishing field borders on headlands or end rows, which are steeper than the designed grade of rows in the cropped strip. Where contour row curvature becomes too sharp to keep equipment aligned with rows during field operations, consider increasing the buffer strip width to avoid sharp ridge points. In drainage ways, consider establishing grassed waterways at least to the point of sharp curvature. These strips should be wide enough to allow the equipment to be lifted and/or turned to meet the same rows across the turn strip.

Where row length in any one direction exceeds 500 feet, ridge height and row grades will need to be designed to ensure water flows to a stable outlet.

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. Considering grade limits, whenever possible, run strip boundaries 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.

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 standing residual cover provides early and late season nesting and escape cover for many species of wildlife displaced from other mowed areas.

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. Where ridge heights, Cover Management Conditions, row gradients or other factors are critical to the design of the practice they will be documented in the case file. The "RUSLE Sheet and Rill Erosion Prediction Worksheet" found in the Illinois Field Office Technical Guide, Section I-Erosion Prediction is an acceptable form of 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). If wildlife enhancement is desired, delays mowing until after the desired species of ground nesting birds have hatched.

Fertilize buffer strips as needed to maintain stand density.

Mow sod turn strips and waterways at least annually.

Spot seed or totally renovate buffer strip systems damaged by herbicide application after residual action of the herbicide is complete.

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 stem density falls below specified amounts 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 the repositioning of buffer strips in order to preserve their relative position on the hill slope.

Renovate vegetated headlands or end row area as needed to keep ground cover above 65 percent.

REFERENCES

Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE); Agriculture Handbook Number 703.

APPENDIX 1

TABLE 1 - COVER MANAGEMENT CONDITIONS

Select the cover management condition that best describes the condition during the 1/4 of the year when rainfall and runoff are most erosive and the soil is most susceptible to erosion. Since the P factor effects are approximate, no provision is made for varying the cover-management condition class during the year.

Description of cropland cover-management conditions used in RUSLE for estimating P-factor values.

Code 1. Established meadow.	In this condition, the grass is dense and runoff is very slow, about the slowest under any vegetative condition. When mowed and baled, this condition is condition 2.
Code 2. 1st year meadow, hay.	In this condition, the hay is a mixture of grass and legume just before cutting. The meadow is a good stand of grass that is nearing the end of the first year. When mowed and baled, this condition becomes a condition 4 for a short time.
Code 3. Heavy cover and/or very rough.	Ground cover for this condition is about 75 to 95%. Roughness would be like that left by a high clearance moldboard plow on a heavy textured soil. Roughness depressions would have the appearance of being 7 inches deep and deeper. Vegetative hydraulic roughness would be like that from a good legume crop, such as lespedeza, that has not been mowed.
Code 4. Moderate cover and/or rough.	The ground cover for this condition is about 40 to 65%. This roughness would be like that left by a moldboard plow in a medium textured soil. Depressions would have the appearance of being about 4 to 6 inches deep. Vegetative hydraulic roughness would be much like that produced by winter small grain at full maturity.
Code 5. Light cover and/or moderate roughness.	Ground surface cover is between 10 to 35% and the surface roughness is like that left by the first pass of a tandem disk over a medium texture soil that has been moldboard plowed. This roughness could also be much like that left after a chisel plow through a medium textured soil at optimum moisture conditions for tillage. Roughness depressions would have the appearance of being on the order of 2 to 3 inches deep. In terms of hydraulic roughness produced by vegetation, this condition is much like that produced by spring small grain at about three fourths maturity.

TABLE 1, cont. - COVER MANAGEMENT CONDITIONS

Code 6. No cover and/or minimal roughness.	This condition is very much like the condition typically found in row cropped fields after the field has been planted and exposed to a moderately intense rainfall. Ground cover is less than about 5% and the roughness is that characteristic of a good seedbed for corn or soybeans. The surface is rougher than that of a finely pulverized seedbed for seeding vegetables or grass.
Code 7. Clean-tilled, smooth, fallow.	This condition is essentially bare, with a cover of 5% or less. The soil has not had a crop grown on it in the last 6 months or more. Much of the residual effects of previous cropping has disappeared. The surface is smooth, much like the surface that develops on a very finely pulverized seedbed exposed to several intense rainfalls. This condition is found in fallowed and vegetable fields, or in newly sown lawns and hay fields.

**Table 2 - GUIDELINES FOR SELECTING RIDGE HEIGHTS
FOR CONTOURING WITH RUSLE**

Select the ridge height that best describes the condition during the 1/4 of the year when rainfall and runoff are most erosive and the soil is most susceptible to erosion.

1. VERY LOW (0.5 - 2 in.) RIDGES

- Plants not closely spaced, but with a perceptible ridge height
- No-till planted row crops
- Fields that have been rolled, pressed or dragged after planting
- Conventionally drilled crops when erosive rains occur during or soon after planting
- Clear seeded hay that leaves a very low ridge

2. LOW (2 - 3 in.) RIDGES

- No-till drilled crops
- Mulch tilled row crops
- Conventionally planted row crops with no row cultivation
- Conventionally drilled small grain when erosive rains are uniformly distributed throughout the year
- Winter small grain when runoff from snowmelt occurs during winter and early spring
- Transplanted crops, widely spaced

3. MODERATE (3 - 4 in.) RIDGES

- Conventionally (clean) tilled row crops with row cultivation
- High yielding winter small grain crops when erosive rains are concentrated in the late spring after plants have developed a stiff, upright stem
- Transplanted crops that are closely spaced and/or in narrow rows

4. HIGH (4 - 6 in.) RIDGES

- Ridge tilled crops with high (4-6") ridges during periods of erosive rain

5. VERY HIGH (Greater than 6 in.) RIDGES

- Ridge tilled crops with very high (6+") ridges during periods of erosive rains
- Hipping, bedding or ridging with very high ridges during periods of erosive rains