NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

CONTOUR BUFFER STRIPS

(Ac.)

CODE 332

DEFINITION

Narrow strips of permanent, herbaceous vegetative cover established around the hill slope, and alternated down the slope with wider cropped strips that are farmed on the contour.

PURPOSE

This practice is applied to support one or more of the following purposes:

- Reduce sheet and rill erosion.
- Reduce water quality degradation from the transport of sediment and other water-borne contaminants downslope.
- Improve soil moisture management through increased water infiltration.
- Reduce water quality degradation from the transport of nutrients downslope.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on all sloping cropland, including orchards, vineyards and nut crops.

Where the width of the buffer strips will be equal to or exceed the width of the adjoining crop strips, the practice Stripcropping (code 585) applies.

CRITERIA

General Criteria Applicable to All Purposes

Surface flow from contoured crop rows must be delivered to a stable outlet.

Design the width of the cropped strip to accommodate some multiple of full equipment width.

Do not plant buffer strips with any plants listed on the noxious weed list of the state.

Do not use buffer strips as travel lanes for livestock or equipment.

Buffer strips are not a part of the normal crop rotation (however, they may be harvested or grazed), and will remain in place until they need to be renovated or re-established.

Row Grade. When the row grade of any crop strip reaches the maximum allowable design grade, establish a new baseline up or down slope from the last buffer strip for the layout of the next crop strip.

Arrangement of Strips. A crop strip will occupy the area at the top of the hill, unless unusually complex topography requires vegetation in this area in order to establish a farmable system.

When used in combination with terraces, diversions or water and sediment control basins, the layout of the buffer strips shall be coordinated with the grade and spacing of the other practices so that the buffer strip boundaries will parallel the practices as closely as possible. Locate the buffer strip immediately upslope from the terrace channel, or diversion, or the storage area of the water and sediment control basin.

Additional Criteria to Reduce Sheet and Rill Erosion

Minimum Row Grade. The cropped strips will have sufficient row grade to ensure that runoff water does not pond and cause unacceptable crop damage.

Maximum Row Grade. The maximum row grade will not exceed:

- One-half of the up-and-down hill slope percent used for conservation planning, **OR** 2%, whichever is less.

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service State Office or visit the Field Office Technical Guide.

- Up to 3% row grade is allowed for a maximum of 150 feet as crop rows approach a stable outlet.

Width of Strips. The minimum width will be

- At least 15 feet wide for strips planted to grasses or grass-legume/forbs mixtures with at least 50% grass and
- At least 30 feet wide when legumes/forbs are used alone or legumes make up more than 50% of the stand.

Increase buffer strip widths as needed to keep the width of the cropped strips uniform. The width of the individual buffer strips may vary.

Cropped strips will be of uniform width between buffer strips and will not exceed 50% of the slope length (L), used for the erosion calculation.

Vegetation. Establish buffer strips to permanent vegetation consisting of grasses, legumes/forbs, or grass-legume/forb mixtures.

Establish species that are adapted to the site, and tolerant of the anticipated depth of sediment deposition.

The buffer strips will have at least 95% ground cover during periods when erosion is expected to occur on the cropped strips.

The stem density for grasses and grass-legume/forb mixtures will be at least 50 stems per square foot, and for pure legume/forb stands at least 30 stems per square foot.

Additional Criteria to Reduce Water Quality Degradation from the Transport of Nutrients Downslope

Minimum Row Grade. Follow the criteria outlined in the Additional Criteria to Reduce Sheet and Rill Erosion.

Maximum Row Grade. Follow the criteria outlined in the Additional Criteria to Reduce Sheet and Rill Erosion.

Vegetation. Establish buffer strips to permanent sod-forming vegetation with stiff, upright stems.

Width of Strips. Buffer strips will be at least 15 feet wide. Increase the buffer strip widths as needed to keep the width of the cropped strips uniform.

The maximum width of cropped strips will be one-half of the field slope length or 150 feet, whichever is less.

Arrangement of Strips. In addition to the buffer strips established on the hillside, establish a buffer strip at the bottom of the slope. Make the bottom strip two times the width of the narrowest buffer strip in the system.

Additional Criteria to Improve Soil Moisture Management Through Increased Water Infiltration

Row Grade. The grade along the upper edge of the buffer strip shall not exceed 0.2%

Width of Strips. The minimum width will be:

- At least 15 feet wide for strips planted to grasses or grass-legume/forb mixtures with at least 50% grass and
- At least 30 feet wide when legumes/forbs are used alone or legumes/forbs make up more than 50% of the stand.

Increase buffer strip widths as needed to keep the width of the cropped strips uniform. The width of the individual buffer strips may vary.

Cropped strips will be of uniform width between buffer strips and will not exceed 50% of the slope length (L), used for the erosion calculation.

Vegetation. Establish buffer strips to permanent vegetation consisting of grasses, legumes/forbs, or grass-legume/forb mixtures.

Establish species that are adapted to the site, and tolerant of the anticipated depth of sediment deposition.

The buffer strips will have at least 95% ground cover during periods when erosion is expected to occur on the cropped strips.

The stem density for grasses and grass-legume/forb mixtures will be at least 50 stems per square foot, and for pure legume/forb stands at least 30 stems per square foot.

CONSIDERATIONS

General. Several factors influence the effectiveness of contour farming to reduce soil erosion. These factors include: 10-year, 24-hour rainfall in inches; ridge height; row grade; slope steepness; soil hydrologic group; cover and roughness; and slope length. Cover and

roughness, row grade, and ridge height can be influenced by management and provide more or less benefit depending on design.

Contour farming is most effective on slopes between 2 and 10 percent. This practice will be less effective in achieving the stated purpose(s) on slopes exceeding 10 percent and in areas with 10-year, 24-hour rainfall over 6.5 inches. The practice is not well suited to rolling topography having a high degree of slope irregularity because of the difficulty meeting row grade criteria.

This practice is most effective on slopes lengths between 100 and 400 feet. As slopes lengthen, the volume and velocity of overland flow are more likely to overwhelm the capacity of contour ridges and narrow buffer strips to contain them. Additional residue cover and other conservation techniques (including widening buffer strips) will decrease overland flow velocities, thus increasing the length of slope on which this practice is effective.

Contour buffer strips are 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.

Areas of existing or potential concentrated flow erosion should be protected by conservation practices such as grassed waterways, water and sediment control basins, or diversion terraces.

Where contour row curvature becomes too sharp to keep equipment aligned with rows during field operations, increasing the buffer strip width can help avoid sharp ridge points. In drainage ways, establishing grassed waterways at least up to the point of sharp curvature can allow the equipment to be lifted and/or turned to meet the same rows across the turn strip.

Prior to design and layout, remove any obstructions or make 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 starting layout or getting the width of one set of strips (one cultivated and one buffer) to pass by an obstruction or ridge saddle.

Additional row markers consisting of field boundaries, hedgerows, fence lines, access lanes, terraces, etc. may be established as needed. Permanent vegetated buffer strips can serve as permanent contour or row markers to maintain design row grades during field operations.

Consider re-establishing the native plant community. Use native species that are appropriate for the identified resource concern and management objective. Consider vegetation that provides multiple benefits to improve other resources.

Food and Cover for Wildlife and Beneficial Organisms. The following management activities may be carried out to enhance benefits for pollinators, natural enemies of crop pests, and wildlife benefits as long as they do not compromise the effectiveness of the buffer strips:

- Plant herbaceous species that provide habitat enhancement for the wildlife species, pollinators, or other beneficial organisms of concern.
- Add native forbs to the seeding mixture to increase habitat diversity or to provide pollen and nectar for beneficial insects.
- Mow the buffer strips every other year or every third year depending upon geographical location. The standing cover provides early and late season nesting and escape cover for many species of wildlife displaced from adjacent disturbed areas.
- Delay mowing until after the nesting period of ground-nesting species, but mow early enough to allow for regrowth before the growing season ends.
- To maximize nutrient interception, choose deep-rooted grasses that will efficiently remove nutrients that enter the soil profile within the buffer strip. Harvest hay regularly to remove surplus nutrients intercepted

PLANS AND SPECIFICATIONS

Prepare plans and specification for each field or treatment unit. Specifications shall describe the requirements to apply this practice to achieve the intended purpose.
As a minimum, record the following specification components in an approved

Contour Buffer Strips, 332, Implementation Requirements document.

- Percent land slope used for conservation planning;
- The minimum and maximum allowable row grades for the contour system;
- The designed widths of the buffer strips
- The species to be established in the buffers strips
- A sketch map or photograph of the field showing:
- The approximate location of the baselines used to establish the system;
- The location of stable outlets for the system;
- Width of equipment to be used on cropped rows.

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 or harvest 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).

Fertilize buffer strips as needed to maintain stand density.

Mow or harvest sod turn strips and waterways at least once a year.

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

Redistribute sediment that accumulates along the upslope edge of the buffer strip/crop strip interface as needed. This sediment shall be spread evenly 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 more, 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 repositioning of buffer strips to maintain their relative position on the hill slope. If an established buffer is removed, a equipment width will be added to one crop strip and subtracted from another.

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

REFERENCES

Foster, G.R. and Seth Dabney, 2005. Revised Universal Soil Loss Equation, Version 2 (RUSLE2) Science Documentation. USDA-ARS, Washington, DC. website: http://www.ars.usda.gov/sp2UserFiles/Place/64080510/RUSLE/RUSLE2_Science_Doc.pdf and http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/tools/rusle2/ (verified March 2014)

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