NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
Contour Buffer Strips
(Acre)
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.

PURPOSES

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

- 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 NRCS Michigan Stripcropping (585) Standard applies.

CRITERIA

General Criteria Applicable to All Purposes

Deliver surface flow from contoured crop rows to a stable outlet.

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

Do not plant contour buffer strips listed on the Michigan noxious weed list will be established in a buffer strip cropping system. See NRCS Michigan FOTG, Section II, Invasive Plant Species List. Also, see the MDA-Prohibited and Restricted Weeds (noxious weeds) list in the NRCS, Michigan eFOTG, Section II.

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

Buffer strips are not a part of the normal crop rotation, (however, CBSs 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 shall occupy the area at the top of the hill, unless unusually complex topography requires vegetating this area in order to establish a farmable system.

When used in combination with terraces, diversions, or water and sediment control basins, coordinate the buffer strip layout with the grade and spacing of the terraces so that the buffer strip boundaries parallel the terraces as closely as possible. Locate the buffer strip immediately up slope from the terrace channel 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 shall have sufficient row grade to ensure that runoff water does not pond and cause unacceptable crop damage.*

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

- One-half of the up and down hill slope percent used for conservation planning

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.

Establish a new baseline up or down slope from the last contour line when the row grade reaches the maximum allowable design grade, used for layout of the next contour pattern.

Width of Strips. The minimum width shall be:

- At least 15 feet wide for strips planted to grasses or grass-legume mixtures with at least 50 percent grass.

- At least 30 feet wide when legumes are used alone or legumes make up more than 50 percent 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.

Keep a uniform cropped strip width between buffer strips and do not exceed 50 percent of the slope length (L), used for the erosion calculation.

Vegetation. Design buffer strips to reduce sheet and rill erosion and sow permanent vegetation consisting of grasses, legumes, or grass-legume mixtures.

Establish locally adapted species to the site, tolerant to the anticipated depth of sediment deposition.

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

The stem density for grasses and grass-legume mixtures shall be at least 50 stems per square foot up or down slope from the last contour line, and for pure legume stands at least 30 stems per square foot.

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

Minimum Row Grade. Follow the Criteria in the purpose to Reduce Sheet and Rill Erosion.

Maximum Row Grade. Follow the Criteria in the purpose to Reduce Sheet and Rill Erosion.

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

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

One hundred fifty feet is the maximum width of cropped strips or one-half of the field slope length, 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 on the hillside.

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 percent.

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 when the slope length on the cropped strips is between 100 and 400 feet. On slopes longer than 400 feet, the volume and velocity of overland flow exceeds the capacity of the contour ridges to contain them. Increasing residue cover and roughness will change the vegetative cover-management conditions and decrease overland flow velocities, thus increasing the slope length at which this practice is effective. Increasing roughness alone is not sufficient to produce this effect.

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.

Protect areas of existing or potential concentrated flow erosion 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 drainageways, 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.

Whenever possible, run strip boundaries parallel with fence lines or other barriers.

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, pollinator, or the other beneficial organisms of concern.

- Add native forbs to the seeding mixture to increase habitat diversity. See the Michigan NRCS Field Border (386) Standard for a list of suggested species.

- 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 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 width of the buffer strips;
- The Species to be established in the buffer strip;
- 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 of buffer strips to maintain appropriate vegetative density and height for optimum trapping of sediment from the up slope cropped strip during the critical erosion period(s).

Fertilize buffer strips as needed to maintain stand density. *Follow MSU-Extension Fertilizer Recommendations for CRP establishment found in the MSU-E Nutrient Calculator in NRCS, Michigan, FOTG, Section IV, G, Technical Tools, Nutrient Management, MSU-E Nutrient Recommendations 6.0 or the MSU Nutrient Management software MSUNM.*

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 up slope edge of the buffer strip/crop strip interface as needed. Spread this sediment evenly up slope over the cultivated strip when needed to maintain uniform sheet flow along the buffer/cropped strip boundary.

If sediment accumulates just below the up slope 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.

Rotate cultivated strips and buffer 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, the equipment width will be added to one crop strip and subtracted from another.

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

References

Foster, G.R. Revised Universal Soil Loss Equation, Version 2 (RUSLE2) Science Documentation (Draft). USDA-ARS, Washington, DC. 20005.

Renard, K.G., G.R. Foster, G.A. Weesies, D.K. McCool, and D.C. Yoder, coordinators. 1997. Predicting soil erosion by water: A guide to conservation planning with the Revised Universal Soil Loss Equation (RUSLE). U.S. Department of Agriculture, Agriculture Handbook 703.

Natural Resources Conservation Service (NRCS) Michigan Electronic Field Office Technical Guide (FOTG) website: http://efotg.nrcs.usda.gov/efotg_locator.aspx?map=MI