

NATURAL RESOURCES CONSERVATION SERVICE

VIRGINIA 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.

PURPOSE

- To reduce sheet and rill erosion.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to sloping cropland.

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

This practice may not be well suited on undulating to rolling topography because of the difficulty of maintaining parallel crop 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 equal or exceed the width of the adjoining crop strips.

CRITERIA

GENERAL

The level of erosion control achieved by the contour buffer strip system shall at least equal the soil erosion level specified by the conservation plan as determined by RUSLE.

The critical slope length for contour buffer strips is 1.5 times the critical slope length for contour farming as determined from the Critical Slope Length Tables in Section 4 of the RUSLE handbook.

"P" subfactors will be developed in accordance with RUSLE. Refer to the Worksheet For Calculation of RUSLE P Subfactors which indicates information needed for subfactor development.

No plants listed on the noxious weed list for Virginia will be established in a contour buffer strip system.

ROW GRADE

The row grade shall be aligned as closely as possible to the contour to achieve the greatest erosion reduction. The requirement of this standard shall be met when 90 percent or more of the crop area has rows with a maximum grade of 1.5% or 1/2 of the field slope percent (used for soil loss calculations) whichever is less.

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

The remaining 10 percent or less of the crop area may have rows with a maximum grade of 3%, or 1/2 of the field slope percent (used for soil loss calculations), whichever is less.

NOTE: Percent makeup of the crop area with varied row grades may be randomly located across the field.

The maximum allowable row grade (as determined for the 10 % crop area) is permitted for a distance of 150 feet, or 1/3 of the row length (flow distance in one direction), whichever is less. EXAMPLE: If the total flow distance in one direction is 300 feet, then 100 feet will be the maximum distance of deviation.

Grade adjustments which exceed 1.5 percent should be made in the upper row reaches. NOTE: Do not permit excessive furrow grades at or near row outlets.

The grade along the up slope boundary of the vegetative buffer shall be the same as for the lower boundary of the cropped strip directly above it.

When the row grade of any crop strip reaches the maximum allowable design grade, a buffer strip will be established and grade corrected for the layout of the next crop strip.

The primary row grade selected for layout purposes (maximum of 1.5%) will be used for developing the "P" value in soil loss determinations, if deviations are only minor or insignificant. If there is a significant deviation (within the requirements of this Standard) from the primary row grade, the percent row grade used will be calculated by the weighted average method. NOTE: See example under the Plans and Specifications section.

CRITICAL SLOPE LENGTH

A contour buffer strip layout shall not occur on a slope that is longer than 1.5 times the critical slope length for contouring, unless supported by other practices. Terraces or diversions may be used to reduce slope length below the critical length. Residue cover and roughness may be increased to decrease overland flow velocities. This also lowers the vegetative cover-management condition code. This results in an increase of the critical slope length and allows the use of this standard on

longer field slopes. NOTE: Increasing roughness alone is not sufficient to change the critical slope length.

ARRANGEMENT AND WIDTH 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.

Cropped strips shall be even width. Their width shall not exceed the lesser of the following:

- a. 50 percent of the slope length used for soil loss calculations
- b. 50 percent of the critical slope length for contour buffer strips, or
- c. widths shown below:

TABLE 1

Percent Field Slope (Used for Soil Loss Calculations)	Maximum Width of Crop Strip (ft.)
1 thru 2	130
3 thru 8	100
9 thru 16	80
17 thru 20	60
21 thru 25	50

NOTE: Crop strip width may be adjusted to the nearest multiple width of planting implements used in the field.

The vegetated buffer strips may be of even or uneven widths, depending upon slope uniformity and the ability to maintain row grades within the requirement of this Standard.

Width of buffer strips at their narrowest point shall be no less than 15 feet when established to grasses or grass/legume mixtures and no less than 30 feet when legumes are used alone.

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 wherever possible.

VEGETATIVE ESTABLISHMENT OF BUFFER STRIPS

General

The buffer strips shall have a Vegetative Cover-Management Condition Code of 1 or 2 that provides protective cover and induces sediment deposition during periods when erosion is expected to occur on the cropped strips. (Cover Management Conditions are described in Chapter 6, "Predicting Soil Erosion by Water, A Guide to Conservation Planning with RUSLE").

Contour buffer strips shall be established to permanent grasses, legumes, or grass/legume mixtures. Species shall be adapted to the site; and tolerant of the anticipated depth of sediment deposition, and the anticipated amount of farm machinery traffic. NOTE: Refer to the *Plant Establishment Guide for Virginia* for species recommendations.

With the exception of native warm season grasses (NWSG), seed should be placed to a depth of 1/4 to 1/2 inch depending on seed size and soil type. Seeding depth should be closer to 1/2 inch on sandy soils and/or for larger size seeds. Do not exceed a depth of 1 inch for all conditions. The maximum seeding depth for native warm season grasses should be 1/4 inch on all soil types.

Legume seeds shall be inoculated within one hour prior to planting time with the correct inoculant. If more than one legume is being seeded, the correct inoculant for each legume must be used. Use two times the recommended rate of inoculant. Also, include a medium recommended by the manufacturer to bond the inoculant to the seed. The inoculant and/or the inoculated seed shall be protected from the sun and excessive heat at all times. NOTE: The inoculant shall not be used beyond its expiration date.

Conventional Seeding

All required seedbed preparation should be performed just prior to and in conjunction with seeding/planting operations. The strips may need re-working if significant rainfall occurs

between the initial seedbed preparation and the seeding/planting operation.

Prepare a firm, smooth seedbed by plowing, disking, and harrowing; or with other suitable tillage implements. Incorporate lime and/or fertilizer into the top 3 (three) to 6 (six) inches of soil as a part of seedbed preparation. Lime and fertilizer application rates will be in accordance with a current soil test. NOTE: Soil may need additional firming with a cultipacker prior to seeding of native warm season grasses.

Apply seed uniformly over a freshly prepared seedbed with a drill, cultipacker seeder or cyclone seeder. Incorporate surface applied seed with a spike tooth harrow or other acceptable farm implement. Firm the seedbed after seeding with a cultipacker unless a cultipacker seeder is used.

Based upon the seeding/planting period, one of the small grains for the fall, winter or early spring or an annual such as foxtail millet for late spring or summer, should be seeded with the permanent species to provide quick cover and erosion protection. Sow small grain or millet with cool season grasses, legumes or mixes at a rate of twenty-five (25) pounds per acre. Sow foxtail millet with native warm season grasses at a maximum rate of five (5) pounds per acre.

NOTE: Remove the nurse crop by haying, etc., if its growth has the potential to adversely affect the establishment of the permanent species. Do not cut below 8 inches when establishing native warm season grasses.

No-Till Seeding

Establishing permanent vegetative buffer strips using no-till methods is acceptable if adequate planning is done well in advance to assure a relatively smooth and weed free soil surface at time of planting. No-till into the stubble of a previous crop or into killed vegetation.

Surface apply lime and/or fertilizer as indicated by a current soil test.

All pesticides should be applied according to the Virginia Conservation Practice Standard *Pest Management (Code 595)*, label directions, and in accordance with Virginia Pest Management Guide recommendations.

NOTE: In some situations, a field planned for a contour buffer strip system may already be in an acceptable permanent vegetative cover. Under these conditions, once the system is laid out and the crop strips plowed, follow the operation and maintenance guidelines in this conservation practice standard.

STABLE OUTLETS

All runoff from the contour buffer strip system shall flow on to stable outlets. Stable outlets include grassed waterways, terraces, diversions, sediment basins, field borders, filter strips, and other similar measures.

CONSIDERATIONS

Prior to design and layout, obstruction removal and changes in field boundaries should be evaluated. Where feasible, suggest to the landowner that the effectiveness of the practice and the ease of performing farming operations may be improved if specific changes are made. When wildlife habitat is destroyed by the removal of obstructions, consider re-establishment of wildlife food and cover plantings on nearby areas.

Contour buffer strips offer an excellent opportunity to mitigate the loss of wildlife habitat, or to establish new wildlife habitat areas; therefore, consider establishing buffer strips to grass and/or legume species or mixes suitable for wildlife habitat.

When haying of the buffer strips is anticipated, establish the strips wide enough (min. 15 ft.) to accommodate harvesting equipment. NOTE: Suggest to the landowner/operator that haying not be performed during the nesting season of April 1 – August 15, if at all possible.

Consider the need for grassed waterways or other water conveyance measures (if none exist) in areas of concentrated flow.

Consider the need to establish field borders and/or filter strips (if none exist) along affected field edges to receive and dispose of diverted surface runoff.

Consider the need to establish permanent vegetative strips along "backbone" ridges to permit re-adjustment of row layout and consequently re-alignment of farm equipment travel during planting, tillage, and harvesting operations.

Consider the width of the landowner/operator's farm machinery and implements when planning the width of the crop strips.

Consider soil types, drainage characteristics and crop tolerance to wetness. Some plants (tobacco is an example) can not tolerate wet conditions. When inadequate drainage poses a potential problem, it may be desirable to lay out a system with row grades closer to the upper range permitted by this Standard.

Consider that water infiltration increase may accelerate the transport of soluble pollutants to groundwater.

When the slope length exceeds the critical slope length for the cover-management condition that best characterizes the field to be contour buffer stripped, plan structures, such as terraces, to reduce slope length below the critical slope length. (Critical slope lengths can be increased by retaining crop residue on the soil surface of the cultivated strips using crop residue management practices.)

At time of 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. Whenever possible, run strip boundaries parallel with fence lines or other barriers as long as row gradient criteria are met. Account for access road widths when they traverse the field and adjust the strip boundary on either side accordingly.

In the layout process, parallel lines (within the crop strip) to each crop strip/buffer baseline should be temporarily flagged and their grades checked to assure positive row drainage whenever shallow depressions are encountered and/or significant slope changes begin to occur.

Additional conservation practices may need to be used in combination with this practice to

meet the goals of the conservation management system.

PLANS AND SPECIFICATIONS

Specifications for installation and maintenance of the Virginia Conservation Practice Standard *Contour Buffer Strips (Code 332)* shall be prepared according to the Criteria, Considerations, and Operation and Maintenance described in this standard and shall be recorded on approved specification sheets and job sheets, and as narrative statements in conservation plans.

As a minimum, record and maintain the following planning data:

- Tract number, field number, and acres
- Field slope length and slope percent used for soil loss calculations
- Critical slope length (1.5 times that for contouring)
- Row grade

EXAMPLE: ROW GRADE CALCULATION WHEN SIGNIFICANT DEVIATIONS OCCUR
(Used to develop "P" value)

Given: 6% slope used for soil loss calculation, primary row grade of 1.5%, 90% of rows on 1.5 % grade, 10% of rows on 3% grade.

% of rows	Row Grade %	Total
90	1.5	135
10	3.0	30
<hr style="width: 50px; margin-left: auto; margin-right: 0;"/> 100		<hr style="width: 50px; margin-left: auto; margin-right: 0;"/> 165

165 divided by 100 = 1.65 weighted average grade

NOTE: The furrow grade/profile grade ratio would be 1.65/6 or .275. Round to the nearest tenth of 0.3, and use with Table # 4 of the RUSLE Handbook to adjust contouring "P" subfactor.

- An establishment plan or job sheet for the vegetated buffer strips including width, planting specifications, any operation and maintenance requirements, and a detailed

sketch of the contour buffer strip layout (include location and kind of row outlets used). NOTE: An aerial map may be used in lieu of a sketch if scale permits.

Upon completion of practice layout, the following documentation will be made:

- Acres in system (crop and buffers)
- Soil Loss Calculations
- Completed Worksheet for Calculation of RUSLE "P" Subfactor.
- Statement of compliance with this standard (includes associated plans and specifications) along with signature of technician and date. The responsible technician will also document that a copy of the "Establishment Plan" for establishing permanent vegetative cover on the buffer strips has been provided to the landuser.

REPORTING AND/OR CERTIFICATION PROCEDURE

Reporting the Contour Buffer Strip system as "applied" and/or certifying the completion of this practice will only be done after the practice has been installed in accordance with this conservation practice standard; and seeding/planting of the permanent species on the vegetated strips was performed within the recommended time period. NOTE: If seeding/planting of the permanent species is performed outside of the recommended time period, reporting and/or certifying will not be done until the vegetative cover becomes sufficiently established to carry out its intended function.

OPERATION AND MAINTENANCE

Conduct all cultural operations on the crop strips parallel to the up slope boundary of each respective vegetated strip.

The buffer strips should be evaluated within several months of seeding. If establishment rate of vegetative cover is 50 to 80 percent, apply additional seed during the next optimum seeding period, preferably with a no-till drill. If establishment rate is less than 50 percent, reseed in accordance with original planting

plan. A no-till drill is also recommended in this situation unless smoothing of rills and/or seedbed preparations are necessary. NOTE: Native Warm Season Grasses may require two growing seasons to become fully established, so allow more evaluation time. Refer to listed reference material which provides specific evaluation guidelines.

Width of contour buffer strips will be maintained in accordance with original design. Any encroachment due to cultural operations will be corrected, and necessary re-establishment performed at the first optimum seeding period after crops have been harvested.

Once established, inspect buffer strips periodically for damage caused by erosion, drought, livestock, herbicides, etc. Any damage will be promptly corrected by making necessary repairs and/or reseeding. NOTE: Use caution when spraying herbicides on adjacent crop strips.

Soil test every 3 to 4 years, and apply needed lime and fertilizer on the buffer strips to maintain a vigorous and dense growth of vegetative cover.

Control weeds and woody growth on vegetated buffer strips by appropriate methods. Time mowing of buffer strips to maintain vegetative density and height for optimum trapping of sediment from the upslope cropped strip during the critical erosion period. For wildlife benefits, do not mow during the nesting season (April 1 - August 15).

NOTE: Removal of the cut material by haying, etc. will enhance wildlife habitat. Do not leave a stubble height of less than 8 inches when cutting native warm season grasses.

To further enhance wildlife habitat, provide option to mow the vegetated buffer strips and remove the growth only every 2 or 3 years, if adaptable to the farming operation.

Sediment which accumulates along the upslope boundary of the buffer strip will be redistributed over the cultivated strip when needed to maintain uniform sheet flow across the vegetated strip. 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 due to sediment, relocate the buffer/cropped strip interface location.

Advise the landuser to monitor the contour buffer strip system on a continuous basis and to inspect for row breakovers and/or excessive scouring along row furrows. NOTE: Measures will be taken to correct any problems detected as soon as feasible and practical.

Diversions or terraces installed in conjunction with a contour buffer strip system shall be maintained in accordance with their respective original design, layout and construction.

Periodically inspect, and adequately maintain grassed waterways, field borders, filter strips, turn strips, or other measures used to receive and convey runoff from the field, and/or used to facilitate equipment operation.

REFERENCES

1. Ag. Handbook # 703, Predicting Soil Erosion by Water: A Guide To Conservation Planning With The Revised Universal Soil Loss Equation (RUSLE).
2. "Native Warm Season Grasses For Virginia and North Carolina (Benefits for Livestock and Wildlife)" by Virginia Dept. of Game and Inland Fisheries, Revised 1995.
3. "Planting and Managing Switchgrass for Forage, Wildlife and Conservation", Publication # 418-013, Virginia Cooperative Extension, by Dale D. Wolf and David A. Fiske, 1995.
4. GM-190, Part 410, "Compliance with NEPA", VA Amendment.
5. *Plant Establishment Guide for Virginia*.
6. Virginia Pest Management Guide, published by the Virginia Cooperative Extension Service (Most current publication, i.e., current year).
7. Virginia Conservation Practice Standard *Pest Management (Code 595)*.

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CONTOUR BUFFER STRIPS

Approved Practice Narratives

(Acre)

(CODE 332)

332 D1 Contour Buffer Strips: Narrow strips of permanent herbaceous vegetative cover will be alternated with wider strips of row and/or close growing crops. The strips will be established and maintained according to the Virginia Conservation Practice Standard and the specification provided.

332 D2 Contour Buffer Strips: Maintain existing strips of permanent herbaceous vegetative cover with the alternating row and/or close growing crop strips. The strips will be maintained in accordance with the Virginia Conservation Practice Standard and the specification provided.

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