NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

CONTOUR FARMING

(Ac.)

CODE 330

DEFINITION

Aligning ridges, furrows, and roughness formed by tillage, planting and other operations to alter velocity and/or direction of water flow to around the hillslope.

PURPOSE

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

- Reduce sheet and rill erosion - Resource Concern (SOIL EROSION – Sheet, rill, & wind erosion).
- Reduce transport of sediment, other solids and the contaminants attached to them - Resource Concern (SOIL EROSION – Sheet, rill, & wind erosion).
- Reduce transport of contaminants found in solution runoff - Resource Concern (WATER QUALITY DEGRADATION – Excess nutrients in surface and ground waters; Pesticides transported to surface and ground waters; Excess pathogens and chemicals from manure, bio-solids or compost applications).
- Increase water infiltration – Resource Concern (INSUFFICIENT WATER - Inefficient Moisture Management).

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on sloping land where crops are grown. For orchards, vineyards and nut crops use Conservation Practice Standard Contour Orchard and Other Fruit Areas (code 331).

CRITERIA

General Criteria Applicable to All Purposes

Minimum Row Grade. The crop rows shall have sufficient grade to ensure that runoff water does not pond and cause unacceptable crop damage. Row grades for soils with slow to very slow infiltration rates (soil hydrologic groups C or D), or for crops sensitive to ponded water conditions shall be designed with positive row drainage of not less than 0.2 percent.

Maximum Row Grade. The maximum row grade shall not exceed one-half of the up-and-down hill slope percent used for conservation planning with a maximum 7 percent row grade.

Up to a 15% deviation from the design row grade is permitted within 150 feet of a stable outlet.

When the row grade reaches the maximum allowable design grade, a new baseline shall be established up or down slope from the last contour line, and used for layout of the next contour pattern.

The row grade shall be aligned as closely as possible to the contour to achieve the greatest erosion reduction. Soil type, undulations on the field, distance between rows and cultural practices for the crop being produced will determine the practical limitations for adherence to a true contour. Most crops growing in steep upland will permit reasonable variations from the true contour in the accomplishment of the objective of the practice. Use the Revised Universal Soil Loss Equation 2 (RUSLE 2) to determine effectiveness of the practice.

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On steep upland sites with hillside ditches or contour furrowing with very high ridge (> 8 inch high), the ditch or furrow will provide permanent guidelines for the contour farming operations. The grade of these ditches or furrow may be either constant or variable but must not exceed that which will result in excessive velocity for the soils encountered. The ditch grade usually varies depending upon design consideration for hillside ditches (Refer to conservation practice standard Hillside Ditches, Code 423). The crop rows between the hillside ditches should normally have a grade of no more than that of the hillside ditches.

Minimum Ridge Height.

- **Row spacing greater than 10 inches.** The minimum ridge height shall be 2 inches during the period of the rotation that is most vulnerable to sheet and rill erosion. Ridge height will be determined using the current approved water erosion prediction technology.
- **Row spacing 10 inches or less.** The minimum ridge height shall be one inch for close-grown crops, such as small grains. Plant height shall be at least 6 inches high and the spacing between plants within the row shall not be greater than 2 inches during the time most vulnerable to sheet and rill erosion.

The minimum ridge height criteria are not required when the Conservation Practice Standard Residue and Tillage Management – No Till (Code 329) is used on the contour and at least 50 percent surface residue cover is present between the rows after planting.

Critical Slope Length

A contour farming layout shall not occur on a hill slope that is longer than the critical slope length, unless supported by other practices (e.g., hillside ditches, diversions) that either reduce slope length below the critical length or reduce overland flow velocities. Increasing residue cover and roughness will change the vegetative cover-management conditions and decrease overland flow velocities. Increasing roughness alone is not sufficient to reduce the critical slope length.

The computation of critical slope length shall be determined using approved erosion prediction technology. (RUSLE 2)

Stable Outlets. Surface flow from contoured fields shall be delivered to stable outlets. All runoff from contouring shall be diverted to stable outlets, such as grassed waterways, field borders, water and sediment control basins and diversions (Refer to practice standards).

Additional Criteria to Increase Water Infiltration

Row Grade. The maximum row grade shall not exceed 0.2%.

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 **of about 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 between 100 and 400 feet long. 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.

The closer the row grade is to the true contour, the greater the erosion reduction. “Absolute row grade” should be should be selected rather than “relative row grade” in the

supporting practices step of RUSLE2 when designing contour strips.

Prior to design and layout, obstruction removal and changes to field boundaries or shape should be considered, where feasible, to improve the effectiveness of the practice and the ease of performing farming operations.

When the intersection of crop rows with the field edge is not perpendicular, Conservation Practice Standard Field Border (Code 386) may be needed to allow farm implements room to turn and control erosion along the field border.

If using ridge till on the contour, avoid crossing over ridged rows at correction areas because this will destroy the effectiveness of the ridges. Sod turn strips may be established if correction areas are unavoidable.

The width of correction areas, and the distance between baselines, should be adjusted for equipment operation widths.

Ridge Height. Ridge height is created by the operation of tillage and planting equipment. The greater the ridge height, the more effective the operation is in slowing overland flow. The RUSLE2 Operations database contains the ridge height value for each field operation.

Stable Outlets. Grassed waterways, water and sediment control basins, underground outlets, or other suitable practices should be used to protect areas of existing or potential concentrated flow erosion.

Contour farming is frequently used in combination with other conservation practices such as Residue Management, No Till, Code 329, Residue Management, Reduce Till, Code 345, Hillside Ditches, Code 423 and others to meet the goals of the Resource Management System.

PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice shall be prepared for each field according to the Criteria, Considerations, and Operation and Maintenance described in this standard. The plans shall include, as a minimum:

- Percent land slope used for conservation planning;
- The minimum and maximum allowable row grades for the contour system;
- 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

Specifications shall be recorded using approved implementation requirement document.

OPERATION AND MAINTENANCE

Perform all tillage and planting operations parallel to contour baselines or terraces, diversions, or contour buffer strip boundaries where these practices are used, provided the applicable row grade criteria are met.

Where terraces, diversions, or contour buffer strips are not present, maintain contour markers on grades that, when followed during establishment of each crop, will maintain crop rows at designed grades. Contour markers may be field boundaries, a crop row left untilled near or on an original contour baseline or other readily identifiable, continuous, lasting marker. All tillage and planting operations shall be parallel to the established marker. If a marker is lost, re-establish a contour baseline within the applicable criteria set forth by this standard prior to seedbed preparation for the next crop.

Farming operations should begin on the contour baselines and proceed both up and down the slope in a parallel pattern until patterns meet. Where field operations begin to converge between two non-parallel contour baselines, establish a correction area that is permanently in sod or established to an annual close-grown crop.

Where contour row curvature becomes too sharp to keep machinery aligned with rows during field operations, establish sod turn strips on sharp ridge points or other odd areas as needed.

REFERENCES

Foster, G.R. Revised Universal Soil Loss Equation, Version 2 (RUSLE2) Science Documentation (In Draft). USDA-ARS, Washington, DC. 2005.

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.

NRCS Conservation Practice Standards:

Grassed Waterway, Code 412

Vegetative Barrier, Code 601

Residue Management, No Till, Code 329

Residue Management, Reduced Till, Code 345

Hillside Ditches, Code 423