

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

CONTOUR FARMING

(Acre)

CODE 330

DEFINITION

Tillage, planting, and other farming operations performed on or near the contour of the field slope.

PURPOSES

- ◆ To reduce sheet and rill erosion.
- ◆ To reduce transport of sediment and other water-borne contaminants.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on sloping land where crops are grown.

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-frequency, single storm EI values greater than 140.

The practice is not well suited to rolling topography having a high degree of slope irregularity because of the difficulty meeting row grade criteria. (EI = total storm energy times the maximum 30-minute intensity).

CRITERIA

General Criteria Applicable to All Purposes

Minimum Row Grade

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 for periods of less than 48 hours, shall be designed with positive row drainage of not less than 0.2 percent on slopes where ponding is a concern.

Maximum Row Grade

The row grade shall be aligned as closely as possible to the contour to achieve the greatest erosion reduction. The maximum grade of rows shall not exceed 2 percent or one half of the up and down hill slope percent used for erosion prediction, whichever is less. Up to 3 percent row grade may be permitted within 150 feet of the approach to a *grassed waterway, field border* or other stable outlet.

Headlands or end rows that are steeper than the maximum row grade criteria stated above shall have a cover-management condition no greater than 3 or established to permanent field borders. [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)*. 1997. USDA Agricultural Research Service, Agricultural Handbook No. 703].

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. All tillage and planting operations will follow the contour line established.

Minimum Ridge Height

The ridge height shall be designed to reduce soil erosion compared to that of rows oriented up and down the slope. As a minimum, this practice shall be designed to achieve a 0.5-2 inch ridge height during the period of the rotation that is most vulnerable to soil erosion. Ridge height design will be determined using on site conditions and current erosion prediction technology approved for use.

The minimum ridge height criteria is not required for close-grown crops, such as small grains, when runoff is reduced compared to that of rows planted

up and down the slope. As a minimum, plant height shall be at least 6 inches high and the spacing between plants within the row shall not be greater than 2 inches.

The minimum ridge height criteria is not required where the practice *residue management, no-till/strip-till* is used on the contour if at least 50 percent surface residue 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., *terraces, 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.

Stable Outlets

All runoff from contouring shall be delivered to stable outlets, such as *grassed waterways, field borders, water and sediment control basins, or underground outlets for terraces and diversions*.

CONSIDERATIONS

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

If using *residue management, ridge-till* on the contour, avoid crossing over ridged rows at correction areas. Consider sod turn strips if correction areas are unavoidable.

Ridge height may vary throughout the year as a result of tillage, planting, some harvest operations, hilling, row cultivation, and weathering. Use of the variable ridge height may be needed in some areas.

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

Grassed waterways, water and sediment control basins, underground outlets, or other suitable

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practices should be used to protect areas of existing or potential concentrated flow erosion.

There are several factors that impact the effectiveness of contour farming to reduce soil erosion. These factors include: 10-year storm EI_{10} value, ridge height, furrow grade, slope steepness, soil hydrologic group, cover and roughness, and the critical slope length. Cover and roughness, row grade, and ridge height can be influenced by management and provide more or less benefit depending on design.

Fields that are cut by gullies, have undulating topography, or are irregular are not suitable for this practice. Fields that have heavy overland flows from above are not suitable unless these flows can be diverted to safe outlets.

Avoid areas that have evidence of mass movement or have the potential for landslips.

A topographic survey will usually be needed to determine the planting patterns that will fit the slopes. Row spacing must be compatible with the planned crops and equipment.

Flat contours may not be desirable where slow drainage may increase disease problems and where furrows could fill with water and overtop the beds. The result can be highly erosive flows creating gullies down the slope.

Minimize the number of point rows by changing row grades within the allowable deviation and performing minor land smoothing.

On irrigated fields, locate the main irrigation pipelines and use them as control lines for staking out rows.

Provide safe outlets for runoff water due to rain or irrigation. Consider use of underground outlet.

Make provisions for protecting land that was disturbed or cleared from erosion until planting is established.

Provide protection for up and down hill farm roads during the rainy. Avoid driving those roads during the rainy season.

Locate permanent guide rows that can be protected

Endangered Species Considerations

Determine if installation of this practice with any others proposed will have any effect on any federal or state listed Rare, Threatened or Endangered species or their habitat. NRCS's objective is to benefit these species and others of concern or at least not have any adverse effect on a listed species. If the Environmental Evaluation indicates the action may adversely affect a listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the landowner selects one of the alternative conservation treatments for installation; or at the request of the landowners, NRCS may initiate consultation with the Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Some species are year-round residents in some streams, such as, freshwater shrimp. Other species, such as steelhead and salmon, utilize streams during various seasons. Be aware that during critical periods, such as spawning, eggs in gravels, and rearing of young may preclude activities in the stream that may directly affect the stream habitat during those periods. For example there should be no disturbance of stream gravel beds that may have eggs in them. That could include any equipment in the stream or even walking in the stream or work upstream that may result in sediment depositing in the gravel beds. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Water Quantity

Contour farming may reduce the rate and the amount of runoff. This may increase the amount of soil moisture until the soil profile becomes

saturated. The amount of water percolate may increase, which may increase the amount of ground water recharge.

1. Effects on the water budget, especially on volume and rates of runoff and infiltration.
2. Potential for a change in plant growth and transpiration because of changes in the volume of soil water.

Water Quality

This practice reduces erosion and sediment production. Less sediment and related pollutants may be transported to the receiving waters.

Increased infiltration may increase the transportation potential for soluble substances to ground water.

1. Potential for development of saline seeps or other salinity problems resulting from increased infiltration in the presence of restrictive layers.
2. Effects on erosion and the movement of sediment, pathogens, and soluble and sediment-attached substances carried by runoff.

PLANS AND SPECIFICATIONS

Plans and specifications are to be prepared for each field. Identify alignment requirements with terraces, diversions, or contour strips, and where contouring is used without these practices.

List the planned grades for planting each crop and the allowable deviation from the contour on each field or parts of fields.

Specify the furrow lengths on surface irrigated fields based on the Irrigation Guide and irrigation system design.

Identify method for marking permanent guide rows and spacing of these guide rows.

Indicate location of water disposal measures.

Include erosion control measures for any up and down

OPERATION AND MAINTENANCE

Maintenance needed for this practice includes protecting the permanent guide rows, periodic inspection and repairs to runoff water outlets, and protecting up and downhill farm roads from erosion.

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 either permanently in sod, established to an annual close-grown crop, or is in cover-management condition 3.

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.

Renovate *field borders* as needed to maintain at least 65 percent ground cover. Maintain adequate field border width to allow farm implements room to turn.