

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

HILLSIDE BENCH

(feet)

CODE 739 CA INTERIM

DEFINITION

An excavated ledge, earth embankment, or a combination excavated ledge and earth embankment constructed on a hillside.

Scope

This standard applies to the planning and design of hillside benches for orchards and vineyards. It does not apply to diversions or terraces.

PURPOSES

To: (1) reduce erosion, (2) reduce slope length, (3) reform the land surface and (4) improve farmability.

CONDITIONS WHERE PRACTICE APPLIES

On sloping lands where: (1) the topography is such that benches can be constructed and farmed with reasonable effort, (2) the soil is of sufficient depth and suitable for orchards and vineyards, and (3) land slips or mass movement are not expected as indicated in soils or other reports.

CRITERIA

Location

Benches shall be designed to minimize disturbance of natural drainage ways, to minimize destruction of vegetative buffer strips next to streams, to control the disposal of surface water for the reduction of soil erosion and to be compatible with topographic features and cultural operations.

Cross-section

The width should be at least two feet wider than the farm machinery to be used but not less than 8 feet. However, there may be short reaches where hand equipment is used and the benches can be narrower. Slopes shall be 3/4:1 or flatter and fill slopes shall be 1-1/2:1 or flatter, unless stable rock is encountered.

The cross-section shall be adequate to convey water resulting from a storm of a 10-year, 24-hours frequency to a protected outlet.

In-slope

In-slope benches shall have a transverse slope toward the hillside of at least 6-inches.

Out-slope

Out-slope benches shall only be installed where soils permit, and where erosion protection such as vegetation can be maintained on the backslope and then in conjunction with in-slope benches being installed at 15 feet vertical distance. Out-slope benches shall have a transverse slope toward the outside shoulder of at least 3 inches. Care must be exercised to assure that concentration of water is avoided.

Alignment

Benches shall be as parallel as practicable. Some point rows may be necessary. Curves shall be long and gentle to accommodate farm machinery. The gradient and the vertical and horizontal alignment shall be adapted to the topography.

Contour Bench

A level or positive grade shall be maintained to a point where it enters the water disposal system.

The grade shall not deviate from the contour more than one not to exceed 200 feet, except grades up to 5 percent are permitted over distances not exceeding 50 feet.

Cross-Slope Bench

The grades shall not exceed 2 percent if cultivated or 4 percent if non-tilled and well vegetated, except steeper grades are permitted over distances not exceeding 100 feet.

Surface Drainage

A water disposal system shall be provided to safely convey surface water down the hillside. This may be by underground outlet, surface conduit, rock lined channel, grassed waterway, or natural drainage way or a combination. There must be a surface water inlet serving each bench if conduits are used. Where water is to be conveyed along the bench for more than 150 feet, a protected waterway shall be considered.

Natural drainage ways or natural cover in drainage outlets shall be protected from disturbance during construction of benches.

In order to reduce sediment pollution, it may be necessary to construct Sediment Basins (350).

Water conveyance system needed for removal of runoff from the hillside shall be designed to conform to appropriate Practice Standards.

Irrigation Systems

Irrigation systems needed for the delivery of irrigation water shall be designed to conform to appropriate Practice Standards.

Vegetation

Disturbed areas shall be established to a vegetative cover as soon as practical after construction. Work shall be performed according to practice standard for Critical Area Planting (342) or Cover Crop (340A).

Steep sloping areas between plant rows shall be left undisturbed and in permanent vegetative cover.

CONSIDERATIONS

Water Quantity

1. Effects upon components of the water budget, especially effects on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and ground water recharge.
2. Variability of the practice's effects caused by seasonal or climatic changes.
3. Effects on downstream flows or aquifers that would affect other water uses or users.
4. Effects on the volume of downstream flow to prohibit undesirable environmental, social, or economic effects.

Water Quality

1. Effects on the movement of sediment, pathogens, and soluble substances carried by seepage toward the ground water.
2. Filtering effects of vegetation on movement of sediment and dissolved and sediment-attached substances.
3. Effects on erosion and the movement of sediment, pathogens, and soluble and sediment-attached substances by runoff.
4. Effects on the visual quality of the water resources.
5. Short-term and construction-related effects of this practice on the quality of the local and downstream water resources.
6. Effects on wetlands or water-related wildlife habitats.

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.

PLANS AND SPECIFICATIONS

Plans and specifications for constructing hillside benches shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

An operation and maintenance plan must be prepared by the Designer for use by the owner or other responsible for operating this practice. The plan should provide specific instructions for operating and maintaining the system to insure that it functions properly. It should also provide for periodic inspections and prompt repair or replacement of damage components.