NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

PRECISION LAND FORMING, (ACRE)

Code 462

DEFINITION

Reshaping the surface of land to planned grades.

PURPOSE

To improve surface drainage and control erosion.

CONDITIONS WHERE PRACTICE APPLIES

On all land that is suitable for the purpose required and where precision land-forming is practical. Soils shall be of sufficient depth and of suitable textures so that after precision land forming is completed an adequate root zone remains to permit the planned use of the land and application of proper conservation measures, soil amendments, and fertilizer.

All precision land forming shall be planned as an integral part of an overall system to facilitate the conservation use of soil and water resources. Due consideration shall be given to the maintenance of wildlife habitat. This standard does not apply in areas needing Conservation Practice Land Smoothing (466), Recreation Land Grading and Shaping (566), and Irrigation Land Leveling (464).

CRITERIA

CRITERIA – GENERAL CRITERIA APPLICABLE TO ALL PURPOSES

This practice shall comply with all federal, state, and local laws.

CRITERIA - AGRICULTURAL LAND

Design and installation shall be based on adequate engineering surveys and investigation. If the land is to be formed for more than one purpose, it must be formed to meet the requirements of the most restrictive purpose and crop.

All forming work must be designed within the slope limits required for the proposed use and provide for the removal of excess surface water. If other conservation practices such as grassed waterways, drainage field ditches, and filter strips are needed to accomplish the stated purpose, they shall be included in the plans for improvement.

Slope Requirements. Slope may be uniform in the direction of flow or may increase or decrease.

Reverse grades in the direction of planned water flow shall not be permitted. Short level sections are permissible to meet field conditions. Depending on cultural practices, cross slopes shall be designed so that "breakthroughs" from rainfall runoff are held to a minimum.

Slope to Control Erosion Caused By Runoff From Rainfall. Design field grades shall be such that erosion caused by runoff from rainfall can be controlled within the limits permissible for conservation farming. When benching between land-formed plots exceeds 1 foot, a permanent grassed area or border ridge must be left between the plots to reduce the possibility of gully erosion.

Surface Drainage. All precision land forming systems shall include plans for

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removing or otherwise providing for control of excess water.

Designs must provide field elevations and field grades that will permit proper functioning of the planned drainage facilities.

Borrow Computations. Excavation and fill material required for or obtained from such structures as ditches, ditch pads, and roadways shall be considered part of the precision land-forming design, and the appropriate yardage shall be included when balancing cuts and fills and determining borrow requirements.

CRITERIA - URBAN AREAS

The grading plan and installation shall be based upon adequate surveys and investigations. The plan is to show the location, slope, cut, fill, and finish elevation of the surfaces to be graded. It shall also show the auxiliary practices for safe disposal of runoff water, slope stabilization, erosion control and drainage such as waterways, lined ditches, diversions, grade stabilization structures, retaining walls, and surface and subsurface drains.

The development and establishment of the plan shall include the following:

1. The cut faces of earth excavation, which is to be vegetated shall not be steeper than 2-1/2 horizontal to 1 vertical. Cut slopes of excavations not to be vegetated shall be at the safe angle of repose for the materials encountered or flatter.
2. The permanent exposed slopes of fills shall be no steeper than 2-1/2 horizontal to 1 vertical.
3. Provisions are to be made to conduct surface water safely to storm drains or suitable natural water courses and to prevent surface runoff from damaging cut faces and fill slopes.
4. Subsurface drainage is to be provided in areas having a high water table to intercept seepage that would affect slope stability, building foundations, or create undesirable wetness.
5. Excavations shall not be made so close to property lines as to endanger adjoining property, unless such excavations are supported in such a manner that will protect such property from erosion, sliding, settling, or cracking.
6. No fill is to be placed where it will slide or wash upon the premises of another. Neither shall it be placed adjacent to the bank of a channel in a manner that would cause bank failure or reduce the natural capacity of the stream.
7. Fills are to consist of material from cut areas, borrow pits, or other approved sources.
8. Retaining walls or cribbing shall be placed as needed to stabilize slopes.

Protective Slopes Around Buildings. The protective slopes shall slope away from building foundations and water supply wells to lower areas or drainage swales or channels. The minimum horizontal length shall be 10 feet except where restricted by property lines. The minimum vertical fall of protective slopes shall be 6 inches, except that the vertical fall at the high point at the upper end of a swale may be reduced 3 inches if a long slope toward a building or from a nearby high bank will not exist. Minimum gradients shall be 1/16 inch per foot (1/2 percent) for concrete or other impervious surfaces and 1/4 inch per foot (2 percent) for pervious surfaces. Maximum gradient of protective slopes shall be 2-1/4 inches per foot (19 percent) for a minimum of 4 feet away from all building walls except where restricted by property lines.

Other Lot Areas. Other lot areas include those to be graded for purposes other than

constructing or protecting buildings. They should be of the size and shape for the intended purpose such as open space, lawns, parking lots, and recreation and service areas. Usable lot areas for such purposes may include protective slopes around buildings.

For concrete or other impervious surfaces, the minimum gradient shall be 1/16 inch per foot (1/2 percent). For pervious surfaces that are subject to ground frost, adverse moisture conditions, or detrimentally expansive soils, the minimum gradient shall be 1/4 inch per foot (2 percent).

Maximum gradient for usable lot area is 5/8 inch per foot (5 percent). For other lot areas not classified as usable areas, the maximum slope shall be 2 feet horizontal to 1 foot vertical. There shall be no limit when a slope is satisfactorily held by existing vegetation or rock outcropping and when present and future stabilization is assured.

Tops and bottoms of banks at swales, terraces, etc., shall be rounded for convenient maintenance.

CONSIDERATIONS

Effects on the water budget, especially on volumes and rates of runoff, infiltration, deep percolation, and evaporation.

Short-term and construction effects of installation on downstream water resources.

Potential for earth moving to uncover or redistribute toxic materials, such as saline soils, and make them available to water or plants.

Effects on wetland hydrology and/or wetland wildlife habitat.

Potential impacts to existing utilities.

Locate and avoid underground utilities.

Effects on soil loss due to increased wind erosion potential and subsequent deposition.

PLANS AND SPECIFICATIONS

Plans and specifications for precision land forming shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purposes.

OPERATION AND MAINTENANCE

Actions shall be carried out to insure that this practice functions as intended. Such actions include periodic checks of drainage structures (field ditches, grassed waterways, etc.) to insure that siltation is not occurring and performing minor maintenance to maintain the required field slopes.