NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

PRECISION LAND FORMING

(Ac.)

CODE 462

DEFINITION

Precision Land Forming is reshaping the surface of land to planned grades.

PURPOSE

This practice improves surface drainage and controls erosion. .

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land where soils will be of sufficient depth and of suitable textures so that after completing precision land forming, an adequate root zone remains to permit the planned use of the land and the application of proper conservation measures, soil amendments, and fertilizer. This standard does not apply in areas needing Conservation Practice *Land Smoothing (466)* or Conservation Practice *Irrigation Land Leveling (464)*.

CRITERIA

General Criteria Applicable To All Purposes

Plan all precision land forming as an integral part of an overall system to facilitate the conservative use of soil and water resources.

Design and installation must be based on adequate engineering surveys and investigations. 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 must be such that water can be contained within the furrows to prevent breakthroughs from rainfall runoff.

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 must include plans for 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 must 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.

Erosion Control. Establish vegetation as soon as possible to disturbed areas by using the Oklahoma NRCS CPS, *Critical Area Planting (342)* and/or the *Oklahoma Plant Materials Technical Note 21*.

If permanent vegetation cannot be established in a timely manner, use appropriate temporary measures to control erosion. If the use of vegetation is precluded and protection against erosion is needed, use Oklahoma NRCS CPS *Mulching (484)* and/or *Cover Crop (340)* to provide surface protection.

During and after construction, use erosion and sediment control measures to minimize off-site damages.

Additional Criteria to Stabilize Areas with Existing or Expected High Rates of Soil Erosion by Water.

A technical determination must be made as to whether or not areas of concern should be mechanically shaped, managed for natural recovery or other structural practices installed.

An example of natural recovery would be where livestock trailing is causing concentrated flow of water and exclusion of livestock or re-routing their movement will allow vegetation to naturally re-establish and stabilize the area. When facilitating practices such as Fencing may be needed, use the Oklahoma Conservation Practice Standard (CPS) NRCS Fence (382).

Gully Shaping. Mechanical shaping may be needed to stabilize severe overfalls or active headcuts. Mechanical treatment will consist of gully shaping. Use form OK-ENG-32 for gully shaping design. An evaluation must be made of the amount and velocity of water flowing through the gully. The gully must be shaped to handle the runoff from a 10-year frequency storm. Use the USDA-NRCS, National Engineering Handbook, Part 650 - Engineering Field Handbook, Chapter 10-Gully Treatment for additional design guidance.

To the extent practical, runoff should be diverted before treatment. Needed management practices should be applied to the upslope contributing area to retain as much water as practical on the watershed above the gully.

If dispersive soils are present in the area to be shaped, internal erosion shall be controlled by a treating the soil of 1.5 lbs of gypsum per square foot and incorporate a minimum of 3 inches into the soil.

Any topsoil shall be stockpiled prior to shaping. After shaping, spread the stockpiled topsoil back over the treated area.

Side slopes will be shaped only to the extent needed to establish the desired vegetative cover. Side slopes shall be no steeper than 2:1. It is recommended that the side slopes be made no flatter than 5:1 in order to keep the treated area exposed to erosion to a minimum. For mechanical maintenance, side slopes should not be steeper than 3:1. The finished side slopes will need 8 to 12 inches of soil material capable of supporting adequate vegetation and having at least one to one and one half inches of available water-holding capacity per foot. If material is not available, consideration should be given to alternatives.

All areas with fill shall be thoroughly compacted with construction equipment. Equipment should be routed in the placement of fill so as to give the best compaction practical. Any fill portion shall be further compacted by running the construction machinery lengthwise on the gully at intervals of 20 - 30 inches.

All trees, rubbish, etc., that will interfere with compaction, vegetative establishment or maintenance shall be removed from the treated area. The material shall not lead to the development of voids.

Items removed will be buried with a minimum of 36” of soil covering.

All non-natural materials must be removed and disposed of prior to NRCS providing technical assistance, unless the site has been certified to be free of hazardous materials. The certification of "No Hazardous Materials Being Present" must be a written statement signed by appropriate personnel from the Oklahoma Department of Environmental Quality (ODEQ), or equivalent authority for Indian tribes. NRCS will not be involved in recommendations for disposal of these materials except for the following:

1. Ascertain if the proposed site is near or within the 100-year floodplain.

2. Determine if the proposed site is located within a known wetland.

3. Provide recommendations for vegetation cover and erosion control measures for the site during the reclamation process.

CONSIDERATIONS

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

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

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

Consider effects on wetland hydrology and/or wetland wildlife habitat.

Address potential impacts to existing utilities by relocating and avoiding all utilities.

Consider 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 must describe the requirements for applying the practice to achieve its intended purpose. Plans and specifications must include construction plans, drawings, job sheets or other similar documents. These documents must specify the requirements for installing the practice.

OPERATION AND MAINTENANCE

An Operation and Maintenance (O&M) plan must be prepared for and reviewed with the landowner or operator. Actions must be carried out to insure that this practice functions as intended. Such action must include performing maintenance when needed to insure that surface irregularities are maintained at the degree of smoothness required. The plan must specify that the treated areas and associated practices be inspected annually and after significant storm events to identify repair and maintenance needs.

REFERENCES

U.S. Department of Agriculture, Natural Resources Conservation Service, Engineering Field Handbook, Chapter 1. Surveying. National Engineering Handbook, Part 650.01, Washington, DC.

U.S. Department of Agriculture, Natural Resources Conservation Service, Engineering Field Handbook, Chapter 4. Elementary Soils Engineering. National Engineering Handbook, Part 650.04, Washington, DC.

U.S. Department of Agriculture, Natural Resources Conservation Service, Engineering Field Handbook, Chapter 10. Gully Treatment. National Engineering Handbook, Part 650.10, Washington, DC.

U.S. Department of Agriculture, Natural Resources Conservation Service, Irrigation Land Leveling. Section 15, Chapter 12. National Engineering Handbook, Part 623.12. Washington, DC.

U.S. Department of Agriculture, Natural Resources Conservation Service, Engineering Field Handbook, Chapter 14. Water Management (Drainage). National Engineering Handbook, Part 650.14, Washington, DC.