**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 to areas needing Conservation Practice Land Smoothing (466) or Conservation Practice Irrigation Land Leveling (464).

## CRITERIA

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 or crop. *Procedures for design and installation of Precision Land Forming are given in Texas Engineering Handbook, Section 15, Irrigation; NRCS, National Engineering Handbook Par 623, Chapter 12, and National Engineering Handbook, Part 624, Chapter 3.*

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, surface field ditches, and filter strips are needed to accomplish the stated purpose, they must 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 must 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.

*Where leaching of salts is required the land grades for precision land forming may be designed for the entire field as a unit or in benches where required by soil and topography conditions. These design alternatives are herein referred to as Field Land forming and Bench Land Forming. The following limiting maximum slopes will be used.*

### ***Field Land Forming***

*The maximum grade after leveling shall not exceed 0.1 foot per 100 feet in the direction of rows or tillage and preferably not more than 0.05 foot per 100 feet and 0.1 per 100 feet at right angles to the rows. Borders should be planned along perimeter boundaries where needed. Borders should be planned with a minimum settled height of 0.8 foot and base width sufficient to maintain this height.*

### ***Bench Land Forming***

*Benches shall be parallel with irregular areas taken up in point benches. The fall from the upper side of the bench to the lower side shall not be more than 0.1 foot. The grade in the direction of rows or tillage shall not be more than 0.1 foot per 100 feet and preferably not more than 0.05 foot per 100 feet. Width of benches shall be determined by a consideration of soil ad topography characteristics and farming equipment.*

*Where leaching of salts is not required, the land grades may be uniform in the row direction or may increase or decrease. The designed row grade should not exceed 0.3 percent and shall not exceed 0.5 percent. Grades of 0.1 percent or less may be used where effective use of rainfall is a consideration and functional furrow tail water drainage of excessive rainfall is facilitated. The designed cross-slope (perpendicular to row grade) shall not exceed 0.5 percent and should not normally exceed 0.3 percent. Cross-slopes must be designed to minimize furrow breakthrough (cross-washing) from the normal seasonal rainfall events.*

**SLOPE TO CONTROL EROSION CAUSED BY RUNOFF FROM RAINFALL.**

Design field grades must 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 must be included when balancing cuts and fills and determining borrow requirements.

**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 land smoothing must 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, 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.

APPROVAL AND CERTIFICATION

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PRACTICE STANDARD APPROVED:

/s/ JOHN MUELLER — November 30, 2015

State Conservation Engineer — Date