

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**PRECISION LAND FORMING**

(Ac.)

**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.

This standard applies to land forming with center-pivot irrigation or other sprinkler and micro irrigation systems. This standard does not apply to surface irrigated land. For surface irrigated land, use Conservation Practice Standard 464 - Irrigation Land Leveling.

**CRITERIA**

All precision land forming shall be planned as an integral part of an overall system to facilitate the conservative use of soil and water resources.

Design and installation shall 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.

**Utilities and Permits.** The landowner shall be responsible for locating all buried utilities in the project area, including drainage tile and other structural measures.

The landowner shall obtain all necessary permissions from regulatory agencies, including the Illinois Department of Agriculture, US Army Corps of Engineers, US Environmental Protection Agency, Illinois Environmental Protection Agency and Illinois Department of Natural Resources – Office of Water Resources, or document that no permits are required

**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 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 shall 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 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.

## CONSIDERATIONS

Land reshaping or forming is an effective means to improve drainage. In recent decades, most land forming has been performed based on a plane surface design using laser technology. With the advent of precise global positioning systems (GPS), it is now technologically feasible to reshape irrigated fields based on a variable slope design. This approach can significantly reduce the depth of cuts and fills, the amount of top soil relocated, and potential the cost of land-forming.

Depending on site conditions, surface land forming may be a cost effective alternative to subsurface drainage.

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.

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

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## 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 purpose.

Construction operations shall be carried out in a manner and sequence so that impacts on the environment will be minimized and held within acceptable limits.

All operations shall be carried out in a safe and skillful manner. Safety and health regulations shall be observed and appropriate safety measures used.

## OPERATION AND MAINTENANCE

An Operation and Maintenance (O&M) plan shall be prepared for and reviewed with the landowner or operator. The plan shall specify that the treated areas and associated practices are inspected annually and after significant storm events to identify repair and maintenance needs.

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.

## REFERENCES

1. National Engineering Handbook, Part 623, Chapter 3, Planning Farm Irrigation Systems, P. 3-7.
2. National Engineering Handbook, Part 650, Water Management (Drainage), Chapter 14, P 14-22.
3. Illinois Drainage Guide, Circular 1226, University of Illinois, P 16-17.
4. Agricultural Drainage, Agronomy Society of America, Monograph Series No. 38. Chapter 32 Surface Drainage.