

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
ARIZONA**

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

Conservation Practices shall be designed on an individual basis to meet site conditions and functional requirements. They shall be part of an approved and overall engineering plan for irrigation, drainage, wildlife, recreation, channel improvement, or similar purposes.

Design and implementation of subsidiary components and/or structures shall meet all applicable Natural Resource Conservation Service (NRCS) conservation practice standards. The criteria for the design of any components not specifically addressed in NRCS practice standards or specifications shall be consistent with sound engineering principles and/or manufacturer recommendations.

Laws and Regulations. *Plan, design, and construct precision land forming to comply with all federal, state, tribal and local laws, rules, and regulations. Laws and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.*

The owner is responsible for securing necessary permits and water rights, complying with all laws and regulations, and meeting legal requirements applicable to the installation, operation, and maintenance of this practice and associated structures.

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.

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.

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 *will be guided by the National Engineering*

Handbook, Part 650, shall be in accordance with the National Engineering Manual, Parts 541 and 542, 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. As a minimum this shall include the following:

- *Project location map, including section, township and range, North arrow, cooperators/owner acknowledgement and certification signature blocks, engineering job class (cover sheet);*
- *References that the owner/cooperator are responsible for all permits, rights-of-way, easements and the contact, coordination and location determination of any existing utilities or clearances (buried utility disclaimer);*
- *If applicable, a map showing the location of the practice(s) or system in reference to a known or established benchmark or reference point with the location, description and elevation clearly shown. Topographical features and/or controls shall be shown, showing tie in with existing or other planned practices;*
- *Field surveys and notes, soil investigations or geologic soil boring locations and soil classifications, earthwork or material estimates/quantities (backfill material);*
- *A plan or system overview of the layout of the precision land forming, including slope, slope direction, and cut/fill quantities; all system components, construction and installation criteria, including State and Federal [OSHA] safety requirements;*
- *Disposal requirements for excess soil material, if applicable;*
- *Site specific construction notes, details or specifications that describe in writing the installation of the precision land forming and components. Include specification for control of concentrated flow during construction;*
- *Use Arizona Construction and Material Specifications for each item of work and*

material, as applicable and available. Additional specifications may need to be written to provide full material and installation instructions. Fill in blanks and add items to the specifications to make them fit the job as needed; and

- *Vegetative establishment requirements, if applicable.*

All designs completed by non-NRCS personal shall meet minimum State licensing board requirements and NRCS requirements and criteria as outlined in the General Manual, the National Engineering Manual (including Arizona Supplements), and the National Engineering Handbook.

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. *O&M Plan shall also include the following:*

- *If fences are installed, they shall be maintained to provide warning and/or prevent unauthorized human or livestock entry.*
- *Eradicate or otherwise remove all rodents or burrowing animals that have or may potentially damage any part of the delivery or application facilities. Immediately repair any damage caused by their activity.*
- *Immediately repair any damage resulting from vandalism, vehicles, livestock or wildlife.*

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.