

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
IRRIGATION LAND LEVELING**

(Ac.)

CODE 464

DEFINITION

Reshaping the surface of land to be irrigated, to planned lines and grades.

PURPOSE

To facilitate the efficient use of water on irrigated land.

CONDITIONS WHERE PRACTICE APPLIES

This standard applies to the leveling of land irrigated by surface or subsurface irrigation systems. The leveling is based on a detailed engineering survey, design, and layout. This standard does not apply to [Precision Land Forming \(462\)](#) or [Land Smoothing \(466\)](#).

CRITERIA

Land to be leveled shall be suitable for irrigation and for the proposed methods of water application. Soils shall be deep enough that, after leveling, an adequate usable root zone remains that will permit satisfactory crop production with proper conservation measures. Limited areas of shallow soils may be leveled to provide adequate irrigation grades or an improved field alignment. The finished leveling work must not result in exposed areas of highly permeable soil materials that would inhibit proper distribution of water over the field.

All leveling work shall be planned as an integral part of an overall farm irrigation system to enhance the conservation of soil and water resources. The boundaries, elevations, and direction of irrigation of individual field leveling jobs shall be such that the requirements of all adjacent areas in the farm unit can be met.

Field grades. If more than one method of water application or more than one kind of crop is planned, the land must be leveled to meet the requirements of the most restrictive method and crop. All leveling work must be

designed within the slope limits required for the methods of water application to be used, to provide for the removal of excess surface water, and to control erosion caused by rainfall. Reverse grades in the direction of irrigation shall not be permitted.

Slope for level basin irrigation methods (zero grade). The maximum fall in the direction of irrigation shall not exceed one-half the design depth of application for a normal irrigation. The difference in elevation across an individual leveled section shall not exceed 0.1 foot.

Slope for graded irrigation methods (single plane). The maximum slope in the direction of irrigation, shall be as follows:

- Furrows - 0.5ft per 100ft
- Borders for sod forming grasses - 2ft per 100ft
- Other Crops - 0.5ft per 100ft

Slope for graded irrigation methods (multi plane slope). The maximum slope in the direction of irrigation shall be as follows:

- Furrows - 0.5ft per 100ft
- Borders for sod forming grasses - 2ft per 100ft
- Other Crops - 0.5ft per 100ft
- The minimum slope in the direction of irrigation shall be as follows:
 - Furrows - 0.05ft per 100ft
 - Borders for sod forming grasses - 0.5ft per 100ft
 - Other Crops - 0.001ft per 100ft no reverse grades

On slopes in the direction of irrigation of more than 0.5ft per 100ft, and where leveling

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designs provide for increasing or decreasing slopes, the following limits shall apply:

- The change in slope in any 100-foot reach shall not exceed one-half the maximum permissible change along the length of run. However, short level sections are permissible at the upper or lower ends of irrigation runs to facilitate water control or to reduce runoff.
- The maximum permissible slope change is the difference between the flattest and steepest design slope along the length of run.

Cross slope. The maximum cross slope for borders shall be 0.1ft per border strip width.

The allowable cross slope for furrows and corrugations depends on the stability of the soil, the size of furrows that are to be used, and the rainfall pattern in the area. Cross slopes must be such that breaking over rows from both irrigation water and runoff from rainfall are held to a minimum.

For multi-plane leveling a maximum of 0.2ft per 100ft is the allowed cross slope to avoid irrigation water from breaking over rows.

Surface drainage. Farm irrigation systems shall include provisions for removing or otherwise controlling excess irrigation and storm water. Leveling designs must provide field elevations and field grades that will permit proper functioning of the planned surface drainage system facilities.

Maximum field elevation. All leveling work shall be designed to permit the delivery of required irrigation flows to the highest point on the field surface. Field elevations shall be at least 0.33 foot below the water surface elevation at the point of delivery.

CONSIDERATIONS

In the design consider the excavation and fill material required for or obtained from such

structures as ditches, ditch pads, and roadways. The appropriate yardage shall be included when balancing cuts and fills and determining borrow requirements.

- Consider related structures and measures needed to control irrigation water and/or storm water runoff.
- Consider crops, method of irrigation, soil intake rates, field slope, irrigation stream size and resulting deep percolation and runoff when determining or evaluating length of irrigation runs.
- Consider the depth of cuts and the resulting available plant rooting depths to saline soils and to shallow water tables.
- In areas with sediment-laden irrigation water, consider increasing the required height of the water surface at the point of delivery.
- Consider effects on water flows and aquifers, and the affect to other water uses and users.
- Consider the effects on adjacent wetlands.

PLANS AND SPECIFICATIONS

Plans and specifications for irrigation land leveling shall be site specific, and show the requirements for installing the practice to achieve its intended purpose. Site specifics include field boundaries, planned cuts and fills, earthwork volumes, cut/fill ratio, direction of irrigation, design run slope and cross slope, required water surface and location of irrigation water delivery, tailwater return/disposal, and appurtenant structures.

OPERATION AND MAINTENANCE

The maintenance on leveled fields includes the periodic removal or grading of mounds and/or depressions. Land grading may periodically be needed to restore the design gradient as a part of the operation and maintenance of the practice.