

**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. Water supplies and irrigation deliveries to the area to be leveled will be sufficient to make irrigation practical for the crops to be grown and the irrigation water application method to be used. 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. Finished leveling work must not expose areas of highly permeable soil materials that would inhibit proper distribution of water over the field.

To enhance soil and water conservation efforts, all leveling work shall be planned as an integral part of an overall farm irrigation system. The boundaries, elevations, and direction of irrigation of individual field leveling

jobs shall be such that farming needs on all adjacent areas in the farm unit can be met.

**Field grades.** If more than one type of irrigation or crop is planned, land must be graded to satisfy requirements of the most restrictive method and/or crop. Field grade range for surface irrigation will be steep enough to efficiently drain the irrigated field but gentle enough to control rainfall-induced erosion. Reverse grades in the direction of irrigation are not permitted.

**Slope for level irrigation methods.** 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 border strip shall not exceed 0.1 foot.

**Slope for graded irrigation methods.** Maximum field grade will not exceed values given in the Oklahoma Irrigation Guide for the soil, crop, and irrigation method planned.

If rainfall-induced erosion is not a significant problem, maximum slope in the direction of irrigation will be:

- Furrows - 3 percent.
- Corrugations - 8 percent.
- Borders for non-sod forming crops, such as alfalfa or grain - 2 percent.
- Borders for erosion-resistant grass, grass-legume crops, or for non-sod forming crops on sites where water application by the border method will not be required until after good crop stands have been established - 4 percent.

In areas where rainfall-induced erosion potential is high, maximum slope for furrows

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**NRCS, OK**  
**July 2012**

shall be: 0.5 percent for furrows, 2 percent for borders with sod-forming grasses, and 0.5 percent for other crops.

On slopes in the direction of irrigation of more than 0.5 percent, and where leveling 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.** Maximum border strip cross-slope will be 0.1 foot per foot of border strip width.

Allowable furrow and corrugation cross slope depends on: 1) soil stability, 2) furrow size, and 3) rainfall pattern. Cross slope should be small enough to minimize the likelihood of runoff and irrigation-induced breakthroughs.

Graded furrow irrigation cross slope will not exceed furrow grade *except* as follows:

Planned Furrow Grade (%)	Maximum Cross Slope (%)
0.05 to 0.15	2 X Furrow Grade
0.15 to 0.30	0.3

**Field slope for subsurface irrigation.** In areas where irrigation is regulated by controlling the water table elevation; land surface will be graded parallel to the water table surface. Cuts and fills will be based on the maximum design soil surface-to-groundwater depth.

**Surface drainage.** Farm irrigation systems shall include provisions for removing or otherwise controlling excess irrigation and storm water runoff. Leveling designs must include field grades and outlet elevations that promote proper functioning of the surface drainage system.

**Maximum field elevation.** Grading plans will permit irrigation to reach a delivery point four inches or more above the highest point of the field.

### CONSIDERATIONS

Include ditch, ditch pads, and roadway excavation and fill volumes when calculating cuts, fills, and total yardage.

Consider related structures and measures needed to control irrigation water and/or storm water runoff.

When estimating irrigation run length consider the: 1) cultivar, 2) irrigation method, 3) soil intake rate, 4) field slope, 5) irrigation discharge rate and 6) deep percolation and/or runoff loss.

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.

### REFERENCES

Oklahoma Irrigation Guide