

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD AND SPECIFICATION**

**IRRIGATION SYSTEM, SURFACE AND SUBSURFACE**

(number and acre)

CODE 443

**DEFINITION**

A planned irrigation system in which all necessary water-control structures have been installed for the efficient distribution of irrigation water by surface means, such as furrows, borders, contour levees, or contour ditches, or by subsurface means.

**PURPOSE**

Efficiently convey and distribute irrigation water to the point of application without causing excessive erosion, water losses, or reduction in water quality.

**CONDITIONS WHERE PRACTICE APPLIES**

Areas must be suitable for irrigation with the quality of water available. Water supplies must be sufficient in quantity and quality to make irrigation practical for the crops to be grown and also must be adequate for the water application methods to be used. Each irrigation system must be designed as an integral part of an overall plan of conservation land use and treatment for the farm that is based on the capabilities of the land and the needs of the farm enterprise.

**CRITERIA**

**Land treatment units.** All conservation farm irrigation systems shall be designed to meet the particular needs of the various land treatment units to be served.

**Conservation irrigation methods.** All farm irrigation system designs shall be based on the use of conservation water application methods that are suited to the site conditions (combination of soil and slope) and the crops to be grown. Adapted methods are those methods that will provide for efficient use of water without destructive soil erosion.

**Capacity.** The capacity of the system and its components shall be adequate to meet the

peak use requirements of the crops to be grown and the required rate of water delivery for the irrigation methods to be used.

If various irrigation methods will be used on the same field, the system capacity must be adequate for the method requiring the highest rate of water delivery. Likewise, if crops with different peak use requirements are to be grown, the system capacity must be based on the crop having the highest use rate.

All ditches and other structures shall be of sufficient size to permit the delivery of required quantities of water without overtopping. All structures shall be designed for the maximum flow conditions to be expected and shall provide for a freeboard consistent with their size an construction and according to appropriate NRCS standards.

**Water surface elevation.** All systems for irrigation by surface methods shall be designed so that the water surface elevation at field intake points is sufficient to provide the required flow onto the field surface. A head of at least 4 inches shall be provided.

Subsurface irrigation systems shall be designed to hold the water table at or between predetermined elevations below the ground surface at all points in the design area.

**Location of head ditches or pipelines.** Head ditches or pipelines used for surface irrigation shall be located so that irrigation water can be applied uniformly over the entire field without causing erosion. Ditch or pipeline spacing shall be of such that irrigation runs are not longer than the maximums specified in local irrigation guides or that determined by adequate field evaluations. If more than one kind of crop is to be grown or more than one method of irrigation is to be used, the ditch or pipeline spacing shall not exceed the allowable length of run determined for the limiting crop or method.

Conservation practice standards are reviewed periodically. To obtain a current version of this standard contact the Natural Resources Conservation Service.

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Feeder ditches or conduits for subsurface irrigation shall be spaced so that the variation in depth from the land surface to the water table is not greater than is permissible for adequate irrigation of the limiting crop to be grown.

**Erosion control.** The design of farm irrigation systems must provide for conveying and distributing irrigation water without causing damaging soil erosion. All unlined ditches shall be located on non-erosive gradients. If water must be conveyed down slopes that are steep enough to cause excessive flow velocities, the irrigation system design shall provide for the installation of such erosion-control structures as drops, chutes, buried pipelines, or erosion-resistant ditch linings.

**Water control.** Farm irrigation systems shall include such structures as measuring devices, division boxes, checks, turnouts, pipelines, line ditches, valves, and gates, as needed, to control and regulate the water for efficient application.

**Seepage control.** Except where seepage is specifically desired for subsurface irrigation, designs shall provide for minimizing these losses.

For surface irrigation systems, ditches shall be located so that they do not cross areas of highly permeable soils. If site conditions require conveyance of water across excessively permeable areas, the irrigation system design shall provide for the use of pipelines, flumes, or lined ditches, as needed, to prevent excessive losses of water by seepage into the soil.

**Waste water disposal.** Irrigation system designs shall include facilities of adequate capacity for the safe removal of excess irrigation and storm water from the field surface. Pickup or waste water ditches constructed for this purpose must be on nonerosive gradients or be stabilized by lining or structural measures if erosion is a hazard. If field elevations do not permit the disposal of waste water by gravity flow, the design shall provide for the installation of pumping units and other needed appurtenant structures.

Waste water ditches must be protected from bank erosion by structures for the entry of waste water or by a vegetative cover on gently sloping banks. If excess water will be reused as irrigation water, the irrigation system design shall provide for pickup ditches so that water does not flow directly from furrows or borders into irrigation head ditches.

## **PLANS AND SPECIFICATIONS**

Plans and specifications for surface and subsurface irrigation systems shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

## **OPERATION AND MAINTENANCE**

All irrigation systems must be adequately maintained to perform as planned and designed. Provisions for maintenance access must be provided.