

**Natural Resources Conservation Service
Conservation Practice Standard**

**IRRIGATION FIELD DITCH
(Ft.)
CODE 388**

DEFINITION

A permanent irrigation ditch, constructed in or with earth materials, to convey water from the source of supply to a field or fields in an irrigation distribution system.

PURPOSE

- To prevent erosion or loss of water quality or damage to the land.
- To make possible proper irrigation water use.
- To efficiently convey and distribute water and minimize conveyance losses.

CONDITIONS WHERE PRACTICE APPLIES

This standard is limited to open channels and elevated ditches of 25 cubic feet per second or less in capacity and constructed of earth materials.

Field ditches shall serve an integral part of an irrigation water distribution system designed to facilitate the conservation use of soil and water resources.

CRITERIA

General

All planned work shall comply with all federal, state and local laws and regulations.

Water supplies and irrigation deliveries for the area served shall be sufficient to make irrigation practical for the crops to be grown and the irrigation water application methods to be used.

Field ditches shall be constructed in earth material that contains enough fines to prevent excessive seepage losses and where

shrinkage cracks will not endanger the ditch, or cause down gradient water quality problems. The sealing effect of sediment carried in the irrigation water may be considered.

Design

Capacity requirements. Field ditches shall have the capacity to deliver to the field a flow adequate to meet:

- The design peak consumptive use of the crops to be grown in the field, with proper provisions for the expected field irrigation efficiency.
- The largest irrigation stream required for the irrigation methods planned for the field.

The design capacity shall include additional flow required to compensate for the ditch seepage loss and to safely carry surface runoff from adjacent lands that must be transported to waterways or overflow points.

For capacity design, the value of Manning's "n" shall be selected according to the materials in which the ditch is constructed, the alignment and hydraulic radius, and the additional retardance due to vegetation.

Velocities. Field ditches shall be designed for flows that are non-erosive for the soil materials in which they are constructed. Local information on the velocity limit for specific soils shall be used if available. If such information is not available, the maximum design velocity shall not exceed those shown in Figure 6-2, Chapter 6 of Technical Release 25 "Design of Open Channels" unless protective measures are implemented.

Field ditches shall be designed with enough capacity to carry the required flows at the

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velocities that will be developed under the maximum probable retardance conditions.

For checking designs to see that velocities do not exceed permissible values, a Manning's "n" no greater than 0.025 shall be used, and applicable criteria in the NRCS standard for Open Channels (582) shall be followed.

Cross-section. Freeboard in field ditches shall be not less than one-third of the maximum design depth of water, to a maximum freeboard of 0.5 feet. Side slopes shall be stable. The top width of banks as measured at the elevation providing the required freeboard shall be not less than 12 inches and shall equal or exceed one-half the flow depth.

If a field ditch is to be constructed on a fill section, the side slopes of the fill shall not be steeper than the values shown in Table 1.

Height to water surface on centerline of fill	Steepest allowable side slope of fill
Less than 3 ft	1-½:1
3-6 ft	2:1
More than 6 ft	2-½:1

Water surface elevations. All field ditches shall be designed so that the water surface elevations at field takeout points are high enough to provide the required flow onto the field surface. If ditch checks or other control structures are to be used to provide the necessary head, the backwater effect must be considered in calculating the freeboard requirements.

The required elevation of the water surface above the field surface will vary with the type of takeout structure or device used and the amount of water to be delivered through each. A minimum head of 4 in. shall be provided.

Related structures. Erosion control or water control structures, culverts, diversions, or other related structures needed to supplement the field ditch shall be designed and installed to meet NRCS standards for the particular structure and type of construction.

CONSIDERATIONS

Water quantity

- Effects on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, and deep percolation.
- Potential for a change in plant growth and transpiration because of changes in the volume or level of soil water.
- Effects on downstream flows or aquifers that would affect other water uses or users.
- Effect on the water table of the field in providing suitable rooting depth for anticipated land uses.

Water quality

- Effects on erosion and the movement of sediment, and the soluble and sediment attached substances carried by runoff.
- Effects on the movement of dissolved substances to ground water.
- Short-term and construction-related effects on the quality of downstream water courses.
- Potential for uncovering or redistributing toxic material.
- Effects on wetlands or water-related wildlife habitats.
- Effects on the visual quality of water resources.
- Effects of water level control on salinity of soils, soil water or downstream water.

PLANS AND SPECIFICATIONS

Plans and specifications for constructing irrigation field ditches shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purposes.

Construction operations shall be carried out in such a manner that erosion and air and water pollution are minimized and held within legal limits. The completed job shall present a workmanlike finish. Construction shall be according to the following requirements as specified for the job.

OPERATION AND MAINTENANCE

An Operation and Maintenance plan shall be prepared for use by the landowner or operator. The plan shall provide specific instructions for operating and maintaining the irrigation field ditches to insure it functions properly. The plan shall include the following provisions:

- Perform prompt repair or replacement of damaged components.
- Remove debris and foreign material that hinder system operation from field ditches and other components.
- Maintain recommended vegetative cover on all slopes and watercourses.

REFERENCES

NRCS Technical Release 25, Ch. 6
NRCS Conservation Practice Standards:
Open Channels, code 582

**Natural Resources Conservation Service
Construction Specification**

IRRIGATION FIELD DITCH

1. SCOPE

This specification covers the minimum requirements for foundation preparation, excavation, and backfill.

2. FOUNDATION PREPARATION

The foundation area for all ditch embankments and ditch pads shall be cleared of all trees, weeds, sods, loose rock, or other material not suitable for the subgrade.

3. PLACEMENT OF EARTHFILL

Earthfill embankments shall be constructed to the neat lines and grades shown on the plans and established at the field location. Embankment materials shall be free of brush, roots, sod, large rocks, or other material not suitable for making compacted fills. The moisture content and methods of placing and compacting fill material shall be of such that a firm, stable embankment results. The fill material shall be placed in horizontal lifts of such thickness that proper

compaction and prescribed densities are obtained.

4. EXCAVATION

Excavation shall be to the neat lines and grades shown on the plans and established at the field location. Excavated materials shall be used in designated fill locations or spoil areas.

Overexcavation in the channel area or overfill on the ditch banks shall be permissible if it does not interfere with the function of the ditch or the related structures and if the finished section generally is smooth.

5. CONSTRUCTION OPERATIONS

Construction operations shall be done in such a manner that erosion and air and water pollution are minimized and held within legal limits. The completed job shall be workmanlike and present a good appearance.