NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

IRRIGATION FIELD DITCH

(ft.)
CODE 388

DEFINITION

A permanent irrigation ditch constructed to convey water from the source of supply to a field or fields in a farm distribution system.

PURPOSE

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

CONDITIONS WHERE PRACTICE APPLIES

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

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. The sealing effect of sediment carried in the irrigation water may be considered.

This standard applies to open channels and elevated ditches of 25 ft^3/s or less capacity. It does not include canals and laterals or ditches constructed and removed during a season or ditches shaped or constructed for lining installations or irrigation canals or laterals that deliver water to a farm.

CRITERIA

Laws and Regulations. This practice must conform to all federal, state, and local laws 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.

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

1. The design peak consumptive use of the crops to be grown adjusted for the expected field irrigation efficiency.
2. The largest irrigation stream required for the irrigation methods planned for the field.

Capacity shall be increased to provide for ditch seepage loss and to deliver surface runoff from adjacent lands to wasteways or overflow points. For capacity design, Manning's “n” shall consider ditch earth material, alinement, hydraulic radius, moss and other vegetation.

Velocities. Field ditches shall be designed using nonerosive velocities on the ditch earth materials. Local information on velocity limits for specific soils shall be used if available. If such information is not available the maximum velocity shall not exceed the limits shown in Appendix A.

Field ditches shall be designed with enough capacity to carry the required flows at the 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 Natural Resources Conservation Service (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. Side slopes shall be stable. Minimum bank top width at freeboard elevation shall be the larger of flow depth or 12 inches.

When a field ditch is to be constructed on an embankment, side slopes of the embankment shall not be steeper than:

Water Surface Height at Fill Centerline	Steepest Allowable Fill Side Slope
Under 3 feet	1.5:1
3 - 6 feet	2:1
Over 6 feet	2.5:1

Water surface elevations. At field takeout points, field ditch water surface elevations must be high enough to provide design flows to the field. If ditch checks or other control structures are used to increase head, freeboard must include backwater effects. Required head above field surface will depend on takeout design and flow needed. Minimum head shall be four inches.

Related structures. Erosion- 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.

Vegetation. At the completion of construction, noncropped disturbed areas must be seeded and fenced, as appropriate, following the standard for Critical Area Planting (342).

CONSIDERATIONS

Consider the water budget including effects on wetlands, effects of runoff, and groundwater recharge.

Consider effects of suspended and dissolved substances and movement of salts and toxic substances.

Study the changes to visual resource concerns.

PLANS AND SPECIFICATIONS

Plans and specifications for field ditches shall meet this standard and shall describe requirements needed to achieve its purposes.

OPERATION AND MAINTENANCE

A plan of operation and maintenance shall be prepared for use by the owner/operator to insure each component functions properly.

Appendix A - Maximum design velocity after aging

Original earth material	Clear water, feet/second	Water transporting colloidal silt, ft./sec.	Water transporting silt, sand, and/or gravel, ft./sec.
Fine sand (noncolloidal)	1.5	2.50	1.50
Sandy loam (noncolloidal)	1.75	2.50	2.00
Silt loam (noncolloidal)	2.00	3.00	2.00
Alluvial silt (noncolloidal)	2.00	3.50	2.00
Ordinary firm loam	2.5	3.50	2.25
Fine gravel	2.5	5.00	3.75
Stiff clay (very colloidal)	3.75	5.00	3.00
Colloidal alluvial silts	3.75	5.00	3.00
Graded loam to cobbles (noncolloidal)	3.75	5.00	5.00
Graded silt to cobbles (colloidal)	4.00	5.50	5.00
Coarse gravel (noncolloidal)	4.00	6.00	6.50
Cobbles and shingles	5.00	5.50	6.50
Shales and hardpans	6.00	6.00	5.00