

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
IRRIGATION CANAL OR LATERAL

(Ft.)

CODE 320

DEFINITION

A permanent channel constructed to convey irrigation water from the source of supply to one or more irrigated areas.

PURPOSE

To facilitate the efficient distribution and use of water on irrigated land

CONDITIONS WHERE PRACTICE APPLIES

- Where a canal or lateral and related structures are needed as an integral part of an irrigation water conveyance system
- Where water supplies for the area served are sufficient to make irrigation practical for the crops to be grown and the irrigation water application methods to be used

Conservation Practice Standard Irrigation Field Ditch (388) should be used for on-farm irrigation water conveyance and/or distribution of less than 25 cubic feet per second.

CRITERIA

Capacity requirements. The capacity of canals or laterals shall be:

- Capable of conveying surface runoff that is allowed to enter the channel, and
- Sufficient to meet delivery demands of all the irrigation systems served and the amount of water needed to cover the estimated conveyance losses in the canal or lateral, or
- Sized to convey the available water supply in water-short areas, where water is not normally available to meet the irrigation demands.

Velocities. Canals and laterals shall be designed for conveying water at velocities that will not

erode the material(s) through which the water passes. If available, local information for unlined canals will be used to determine velocity limits for specific soils. If this is unavailable, maximum design velocity shall not exceed values given in the National Engineering Handbook Part 654 (Stream Restoration Design Handbook) Section 654.0803, Figure 8-4 or determined using an equivalent method. Maximum permissible velocity for unlined canals and earthen laterals will be calculated using 0.025 or less for Manning's roughness coefficient "n". Design velocities should not exceed 1.5 ft/sec for sandy loam soils, 2.0 ft/sec for silt loam soils, and 2.5 ft/sec for clay loam soils.

Capacity. Canals and laterals shall be designed to safely convey the maximum required flow under conditions of maximum probable retardance. For design purposes, the value of Manning's "n" will be based on the canal or lateral: 1) material, 2) alignment, 3) hydraulic radius, and 4) expected vegetative growth at the lowest level of planned maintenance

Freeboard. Required freeboard above the maximum design water level shall be at least one-third of the design flow depth, and never less than 0.5 foot.

Water surface elevations. Water surface elevations shall be high enough to furnish the hydraulic head needed to properly operate ditches and conveyance structures diverting water from the canal or lateral.

Side slopes. Canals and laterals shall be designed with stable side slopes, based on the specific soil and/or geologic material used. Limits shall be based on local construction guides, otherwise side slopes for the banks of canals or laterals shall not be steeper than those given in Section 650.1412(d)(3) of the Engineering Field Handbook

(EFH) Part 650, Chapter 14.

Top width. Canal or lateral bank top width shall be broad enough to ensure stability, prevent excessive seepage, and facilitate maintenance. Top width shall not be less than 2 feet and shall equal or exceed maximum designed flow depth.

Protection from surface waters. Runoff from adjacent areas shall be conveyed over or under the canal wherever practical. If runoff is permitted to enter the canal or lateral, the side slopes shall be protected from erosion and provisions made for its disposal. If sediment-laden runoff is allowed to enter the canal or lateral, the channel shall be designed to remove it by trapping or transporting.

Related structures. Canal and lateral design shall include turnouts, checks, crossings, and other appurtenant structures needed for successful system operation. All structures shall comply with NRCS practice standards and erosion control structures shall be installed before the canal or lateral system begins operating.

Linings. On sites with a medium- to highly-permeable soil, or where erosive water velocities occur, canals and laterals shall be lined or piped according to the appropriate NRCS Practice Standard(s) for ditch and canal linings or pipelines.

Maintenance access. Provisions shall be made for maintenance operations. If the top of a bank or berm will be used as a roadway, it shall be wide enough to safely accommodate equipment travel and operation.

CONSIDERATIONS

When planning this practice, the following shall be considered:

- Safety features that can be included in the design.
- Soluble contaminant and sediment transport as well as adsorbed insoluble contaminant transport to surface water and migration to groundwater.
- Using buffers or filters to remove sediment from runoff water.
- The effects on downstream flows or aquifers that would affect other water uses or users.

- The volume and rate of runoff, infiltration, evaporation, transpiration, deep percolation, and groundwater recharge.
- Wetlands or aquatic wildlife habitats.
- The visual quality of the soil, water, and plant resources.
- Changes in plant growth and transpiration from changes in the volume or level of soil water.
- Effect on water table elevation in fostering suitable rooting depth for the anticipated land use.

PLANS AND SPECIFICATIONS

Plans and specifications for constructing irrigation canals or laterals shall describe the requirements for applying the practice to achieve its intended purposes. Site-specifics typically include location of canal and laterals, cross-section details, embankment/bank requirements, channel grades, spoil placement, and appurtenance structure details.

Information shall be provided on the recommended species of vegetative cover, cover establishment, and maintenance.

If applicable, Conservation Practice Standard "Critical Area Planting (Code 342)" specifications shall also be included in the plan.

OPERATION AND MAINTENANCE

A site-specific operation and maintenance plan shall be provided to and reviewed with the landowner before the practice is installed. The plan shall include the following provisions:

- Perform periodic and post-storm inspections to detect and minimize damage to the canal or lateral.
- Perform prompt repair or replacement of damaged components.
- Remove debris and foreign material that hinder system operation.
- Maintain recommended vegetative cover on all slopes and watercourses. Note: when possible, mowing or other activities that disturb vegetation should not be scheduled

during the primary nesting season of grass-nesting birds.

REFERENCES

USDA, NRCS. 2001. National Engineering Handbook, Part 650, Engineering Field Handbook, Chapter 14, Water Management (Drainage).

USDA, NRCS. 2007. National Engineering Handbook, Part 654, Stream Restoration Design Handbook, Chapter 8, Threshold Channel Design.