

**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 convey irrigation water to one or more irrigated areas.

**CONDITIONS WHERE PRACTICE APPLIES**

A canal or lateral and related structures are needed as an integral part of an irrigation water conveyance system.

Water supplies and irrigation deliveries 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.

**CRITERIA**

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

**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 at velocities that are nonerosive for the material(s) through which the channel passes. Local information on the velocity limits for specific soils shall be used if available. If such information is not available, the maximum design velocities shall not exceed those shown in Figure 6-2, Chapter 6, TR-25 “Design of Open Channels” or other equivalent method. For unlined canals and laterals constructed with earthen materials, a Manning’s “n” no greater than 0.025 shall be used to check that velocities do not exceed permissible values.

Canals and laterals shall be designed to safely convey the required flows with the maximum probable retardance conditions. For capacity design, the value of “n” shall be selected according to the material in which the canal or lateral is constructed, the alignment, the hydraulic radius, the expected vegetative growth and planned operation and maintenance.

**Freeboard.** The required freeboard above

the maximum design water level shall be at least one-third of the design flow depth (0.33d) and shall not be less than 0.5 feet.

**Water surface elevations.** Water surface elevations shall be designed to provide enough hydraulic head for successful operation of all ditches or other water conveyance structures diverting from the canal or lateral.

**Side slopes.** Canals and laterals shall be designed to have stable side slopes. Local information on side slope limits for specific soils and/or geologic materials shall be used if available. If such information is not available, the design side slopes for the banks of canals or laterals shall not be steeper than those shown in Table 1.

**Table 1, Canal Bank Sideslopes**

Material	Side Slope <sup>1</sup>
Solid rock, cut section	¼:1
Loose rock or cemented gravel, cut Section	¾:1
Heavy clay, cut section	1:1
Heavy clay, fill section	2:1
Sand or silt with clay binder, cut or fill section	1-1/2:1

<sup>1</sup> Horizontal to vertical ratio

**Canal or lateral banks.** The top width of the canal or lateral banks shall be designed to ensure stability, prevent excessive seepage, and facilitate maintenance. The bank top width shall not be less than 2 feet and shall equal or exceed the 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 shall be made for its disposal. Where sediment-laden water is allowed to enter the canal or lateral,

the design shall include provisions to transport the sediment through the canal or lateral or measures shall be installed to trap and remove the sediment.

**Related structures.** Designs for canals or laterals shall provide for adequate turnouts, checks, crossings, and other related structures needed for successful operation of the facility. All structures shall be designed in accordance with the applicable NRCS Practice Standard(s). Structures needed for the prevention or control of erosion shall be installed before the canal or lateral is put into operation.

**Linings.** On sites where soils with moderately rapid to very rapid permeability must be crossed or where erosive water velocities will occur, the 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 provided, as required, for maintenance operations. If the top of the bank or berm is to be used for a roadway, the width shall be wide enough to allow safe equipment travel and operation.

## CONSIDERATIONS

When planning this practice, consider the following, as applicable:

Features need to incorporate safety elements.

The movement of sediment, and the soluble and sediment-attached substances carried by runoff to surface waters and the movement of dissolved substances to groundwater.

Using buffers or filters to remove sediment from runoff water.

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 ground water recharge.
- Erosion on the banks and bed of the channel.
- Wetlands or water-related wildlife habitats.
- The visual quality of the soil, water and plant resources.
- Cultural resources.

## REFERENCES

- NRCS, Technical Release 25, Design of Open Channels
- NEH Section 5, Hydraulics, Supplement B

## 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 cross-section details, embankment/bank requirements, channel grades and appurtenant structural details.

## OPERATION AND MAINTENANCE

A site-specific operation and maintenance plan shall be provided to, and reviewed with, the landowner(s) before the practice is installed. The plan shall adequately guide the landowner(s) in the routine maintenance and operational needs of the irrigation canal or lateral. The plan shall also include guidance on periodic inspections and post-storm inspections to detect and minimize damage to the canal or lateral.

The plan shall as a minimum include requirements for the removal of accumulated sediment and debris from the channel, the repair of banks and berms and control of undesired vegetation.