

**Natural Resources Conservation Service  
CONSERVATION PRACTICE STANDARD**

**IRRIGATION CANAL OR LATERAL**

**CODE 320**

(ft)

**DEFINITION**

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

**PURPOSE**

This practice is used to accomplish the following purpose:

- 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 application practical for the crops to be grown.

Use NRCS Conservation Practice Standard (CPS) Irrigation Field Ditch (Code 388) for on-farm irrigation water conveyance or distribution of less than 25 cubic feet per second.

**CRITERIA**

**General Criteria Applicable to All**

**Purposes Capacity requirements**

Design canals and laterals to safely convey the required flows based on the maximum probable retardance conditions. For capacity design, select the value of Manning's roughness coefficient "n" according to the—

- Material in which the canal or lateral is constructed.
- Alignment.
- Hydraulic radius.

NRCS reviews and periodically updates conservation practice standards. To obtain the current version of this standard, contact your Natural Resources Conservation Service State office or visit the Field Office Technical Guide online by going to the NRCS website at <https://www.nrcs.usda.gov/> and type FOTG in the search field.

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- Expected vegetative growth, ~~and~~.
- Planned operation and maintenance.

The capacity of canals or laterals will be—

- Capable of conveying surface runoff that is allowed to enter the channel.
- Sufficient to meet delivery demands for 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**

Design the velocity in canals and laterals ~~that are to be~~ nonerosive for the materials through which the channel passes. For unlined canals, use local information, if available, on the velocity limits for specific soils. If such information is not available, the maximum design velocities will not exceed those shown in the NRCS National Engineering Handbook (NEH) (Title 210), Part 654, Chapter 8, "Threshold Channel Design," Figure 8-4, or other equivalent method. For unlined canals and laterals constructed with earthen materials, use a value of Manning's roughness coefficient "n" no greater than 0.025 to check that velocities do not exceed permissible values.

### **Freeboard**

Include freeboard above the maximum design water that is at least one-third of the design flow depth and not less than 0.5 feet.

### **Water surface elevations**

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

### **Side slopes**

Design canals and laterals to have stable side slopes, based on specific soils or geologic materials used. Do not design side slopes for the banks of canals or laterals steeper than those shown in the 210-NEH, Part 650, Chapter 14, "Water Management (Drainage)," Section 650. ~~1412(d)(3)~~ 1405G(5).

### **Top width**

Design the top width of the canal or lateral banks to ensure stability, prevent excessive seepage, and facilitate maintenance. The minimum acceptable bank top width is 2 feet and will equal or exceed the flow depth.

### **Protection from surface waters**

Convey runoff from adjacent areas over or under the canal wherever practical. If runoff is permitted to enter the canal or lateral, protect the side slopes from erosion, and make provisions for its disposal. Where sediment-laden water is allowed to enter the canal or lateral, include in the design provisions to transport the sediment through the canal or lateral, or install measures to trap and remove the sediment.

### **Related structures**

Designs canals or laterals with adequate turnouts, checks, crossings, and other related structures needed for successful operation of the facility. Design all structures in accordance with the applicable NRCS conservation practice standard. Install structures needed for the

prevention or control of erosion before the canal or lateral is put into operation.

### **Linings**

On sites with soils of moderately rapid to very rapid permeability, or where erosive water velocities will occur, line the canals and laterals or use pipe according to ~~the appropriate NRCS conservation practice standards for ditch and canal linings or pipelines.~~ NRCS CPS Irrigation Ditch Lining (Code 428) or Irrigation Pipeline (Code 430).

### **Maintenance access**

Provide provisions, as required, for maintenance operations. If the top of the bank or berm is used for a roadway, design the width wide enough to allow safe equipment travel and operation according to the appropriate NRCS CPS.

### **Spoil disposal**

Spread any spoil as soon as feasible using NRCS CPS Spoil ~~Spreading~~Disposal (Code 572). If the spoil is placed along the canal or lateral, ensure the spoil banks have stable side slopes. Locate the spoil banks so the spoil material does not erode back into the canal or lateral. Where necessary, make provisions to channel runoff water through the spoil bank and into the canal or lateral without causing excessive erosion.

### Vegetation

Establish vegetation or otherwise stabilize disturbed areas above the expected normal water elevation as soon as practical after construction. Vegetation established shall conform to NRCS CPS Critical Area Planting (Code 342).

### Laws and regulations

Plan, design, and construct this practice to comply with all Federal, State, Tribal, and local laws and regulations.

### Cultural resources

Evaluate the existence of cultural resources in the project area and any project impacts on such resources. Provide conservation and stabilization of archeological, historic, structural, and traditional cultural properties when appropriate.

## **CONSIDERATIONS**

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

- Features need to incorporate safety elements.
- The movement of sediment and soluble and sediment-attached substances carried by runoff to surface waters, and the movement of dissolved substances to ~~ground-~~watergroundwater.
- Using buffers or filters to remove sediment from runoff water.
- When revegetating disturbed ground, consider including plant species that support pollinators and other beneficial insects. Also, note that in general, native plant species support fewer crop pests compared to nonnative or invasive plants. Larger vegetation could be restricted to one side of a canal to allow access for canal management.
- Wetlands or water-related wildlife habitats.
- Downstream flows or aquifers that would affect other water users or uses, including drinking water sources.

- Consider extent of damage associated with potential overtopping when designing freeboard.

## PLANS AND SPECIFICATIONS

Prepare plans and specifications that describe the requirements for applying the practice according to the requirements of this standard. As a minimum, in the plans and specifications include—

- A plan view or map showing the location and extent of the planned canal or lateral.
- Cross section details.
- Profiles or channel grades.
- Embankment/bank details.
- Spoil placement details.
- Structural details for ~~appurtenant~~appurtenant structures.
- Specifications that describe in writing detailed requirements for installation.
- If applicable, revegetation details, including recommended species of vegetative cover, establishment method, and maintenance. If applicable, incorporate NRCS CPS Critical Area Planting (Code 342) specifications.

### Location of utilities and notification requirements.

- \_\_\_\_\_
- If applicable, safety features.

## OPERATION AND MAINTENANCE

Prepare an ~~Provide a site-specific~~ operation and maintenance plan ~~to landowners, for use by the landowner or operator. Provide specific instructions for operating and review it with them before the practice is installed, maintaining the irrigation field ditch to ensure proper function as designed.~~ As a minimum, include in the plan—

- Performing periodic and post-storm inspections to detect and minimize damage to the canal or lateral.
- Performing prompt repair or replacement of damaged components.
- Removing debris and foreign material that hinder system operation.
- Maintaining recommended vegetative cover on all slopes and watercourses. When possible, mowing or other disturbance of vegetation should be scheduled outside of the primary nesting season for grass-nesting species.

## REFERENCES

USDA NRCS. ~~2004~~2021. National Engineering Handbook (Title 210), Part 650, Engineering Field Handbook, Chapter 14, Water Management (Drainage). Washington, D.C.  
<https://directives.sc.egov.usda.gov/>

USDA NRCS. 2007. National Engineering Handbook (Title 210), Part 654, Chapter 8, Threshold Channel Design. Washington, D.C. <https://directives.sc.egov.usda.gov/>