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 at velocities that are nonerosive for the material(s) through which the channel passes. For unlined canals, 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 the National Engineering Handbook Part 654 (Stream Restoration Design Handbook) Section 654.0803, Figure 8-4 or other equivalent method. For unlined canals and laterals constructed with earthen materials, a value of Manning's roughness coefficient "n" no greater than 0.025 shall be used to check that velocities do not exceed permissible values.

Capacity. Canals and laterals shall be designed to safely convey the required flows with the maximum probable retardance conditions. For capacity design, the value of Manning's roughness coefficient "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 and shall not be less than 0.5 foot.

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, based on specific soils and/or geologic materials used. The design side slopes for the banks of canals or laterals shall not be steeper than those shown in Section 650.1412(d)(3) of the Engineering Field Handbook (EFH) Part 650, Chapter 14.

Top width. 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. Structures needed for the prevention or control of erosion shall be installed 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, 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.

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 appurtenant structural details.

If applicable, information will be provided on recommended species of vegetative cover, cover establishment and maintenance.

If applicable, Conservation Practice Standard “Critical Area Planting (Code 342)” specifications will be incorporated

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 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. When possible, mowing or other disturbance of vegetation should be scheduled outside of the primary nesting season for grass-nesting species.

CERTIFICATION

Certification documentation upon completion requires:

- Length of Ditch or Canal
- Backfill class and Material class (if applicable)
- Dimensions, width, depth, side slope
- Capacity of flow
- Conservation measures implemented

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.