

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**SURFACE DRAINAGE, FIELD DITCH**

(Ft.)

**CODE 607**

**DEFINITION**

A graded ditch for collecting excess water in a field.

**PURPOSE**

Collect or intercept:

- excess surface water, such as sheet flow from natural and graded land surfaces or channel flow from furrows, and carry it to an outlet;
- excess subsurface water and carry it to an outlet.

**CONDITIONS WHERE PRACTICE APPLIES**

Applicable sites are flat or nearly flat and:

1. Have soils that are slowly permeable (low permeability) or that are shallow over barriers such as rock or clay, which hold or prevent ready percolation of water to a deep stratum.
2. Have surface depressions or barriers that trap rainfall.
3. Have insufficient land slope for ready movement of runoff across the surface.
4. Receive excess runoff or seepage from uplands.
5. Require the removal of excess irrigation water.
6. Require control of the water table.
7. Have adequate outlets available for disposal of drainage water by gravity flow or pumping.

**CRITERIA**

**General Criteria Applicable to All Purposes**

Drainage field ditches shall be planned as integral parts of a drainage system for the field served and shall collect and intercept water and carry it to an outlet with continuity and without ponding. Compliance with federal, State, and local laws and regulations is required.

Chapter 14, Engineering Field Handbook (EFH), Part 650, National Engineering Handbook (NEH) shall be used as a guide for design of surface drains.

**Investigations.** An adequate investigation shall be made of all sites.

**Location.** Ditches shall be established, insofar as topography and property boundaries permit, in straight or nearly straight courses. Random alignment may be used to follow depressions and isolated wet areas of irregular or undulating topography. Excessive cuts and the creation of small irregular fields shall be avoided.

On extensive areas of uniform topography, collection or interception ditches shall be installed as required for effective drainage.

**Design.** The size, depth, side slopes, and cross section area shall:

1. Be adequate to provide the required drainage for the site.
2. Permit free entry of water from adjacent land surfaces without causing excessive erosion.
3. Provide effective disposal or reuse of excess irrigation water (if applicable).
4. Conduct flow without causing excessive erosion.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resource Conservation Service or download the standard from the electronic Field Office Technical Guide for Missouri.

**NRCS MOFOTG  
September 2006**

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5. Provide stable side slopes based on soil characteristics.
6. Permit crossing by field equipment if feasible.
7. Permit construction and maintenance with available equipment.

### **Crossable field ditches**

Use the dimensions obtained from the crossable field ditch table in the Missouri Supplement to the EFM, Chapter 14 or design the ditch to carry the discharge determined by  $Q=70M^{0.7}$  \*. The velocity shall be as specified for non-crossable ditches.

The flattest channel grade shall be 0.05 percent.

Channel grade should not exceed 0.6 percent.

Channel must be deep enough to provide drainage from the crop rows. Ditch bottom shall be at least 0.6 foot below the adjacent field surface. For cross slope ditches, part of the total depth may be obtained by constructing a crossable dike on the down slope side of the channel. The minimum top width for the dike is 3 feet. Side slopes for the dike will be the same as for the channel.

Excessive depths should be avoided to prevent erosion on the ditch sides.

### **Non-crossable field ditches**

Ditch capacity shall be adequate to carry the discharge determined by  $Q=45M^{0.83}$  \*.

This discharge may be found in curves in the Missouri Supplement to the EFH, Chapter 14.

Average channel velocity shall not exceed the maximum velocities shown in Table 14-3 of the EFM, Chapter 14.

Manning's formula will be used to determine the average velocity in a ditch section. The value of the roughness coefficient "n" should be 0.04.

Ditch bottom shall be at least 0.6 foot below the adjacent field surface. For "V" ditches, the depth should be measured from a point where the channel is 2 feet wide. Design depth shall be contained within the constructed channel except for minor field depressions. Side

slopes should not be steeper than 2 (horizontal):1 (vertical).

\*note:

Q= Discharge in cubic feet per second

M= Drainage area in square miles

### **CONSIDERATIONS**

When planning this practice, the following items should be considered where applicable:

- Potential impacts on downstream flows or aquifers that would affect other water uses or users.
- Potential water quality impacts for soluble pollutants, sediments and sediment-attached pollutants.
- Potential for uncovering or redistributing toxic materials.
- Impacts on cultural resources
- Effects on wetlands or water-related wildlife habitats.
- Effects of water level control on soil water, downstream water temperature or salinity of soils.
- The need for riparian buffers, filter strips and fencing.
- Effects on water budget components, especially the relationships between runoff and infiltration.

### **PLANS AND SPECIFICATIONS**

Plans and specifications for constructing drainage field ditches shall be in keeping with this standard and shall describe the requirements for properly installing the practice to achieve its intended purpose.

### **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 ditch(es). The plan shall also include guidance on periodic inspections and post-storm inspections to detect and minimize damage to the ditch(es).