

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**SURFACE DRAIN, FIELD DITCH**

(Ft.)

**CODE 607**

**DEFINITION**

A graded ditch for collecting excess water in a field.

**PURPOSE**

This practice may be applied as part of a resource conservation system to achieve one or more of the following:

- Interception of excess subsurface water and conveyance to an outlet.
- Collection or interception of excess surface water, such as sheet flow from natural and graded land surfaces or channel flow from furrows, and conveyance to an outlet.
- Drainage of surface depressions.

**CONDITIONS WHERE PRACTICE APPLIES**

The practice is applicable to sites that:

- Have soils that are slowly permeable (low permeability) or are shallow over barriers such as rock or clay, which hold or prevent ready percolation of water to a deep stratum.
- Have surface depressions or barriers that trap rainfall.
- Have insufficient land slope for ready movement of runoff across the surface.
- Receive excess runoff or seepage from uplands.
- Require the removal of excess irrigation water.
- Require control of the water table.

**CRITERIA**

**General Criteria Applicable to All purposes**

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.

**Investigations.** An investigation shall be made to assure adequate outlets are available for discharge of drainage water by gravity flow or pumping.

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

**Size.** The size of field ditch shall be computed by applying Manning's formula.

**Velocity.** The design velocity shall not exceed the maximum velocity contained in Table 14.3 of NRCS National Engineering Handbook, Part 650, Engineering Field Handbook, Chapter 14, Water Management (Drainage).

**Criteria Applicable to Interception of Excess Subsurface Water**

**Capacity.** One or more of the following shall determine the required capacity:

- Application of locally tried and proven drainage coefficients to the acreage drained, including added capacity required to dispose of surface water entering through inlets.
- Yield of ground water based on the expected deep percolation of irrigation water from the overlying fields, including the leaching requirement.

- Comparison of the site with other similar sites where subsurface drain yields have been measured.
- Measurement of the rate of subsurface flow at the site during a period of adverse precipitation and ground water conditions.
- Application of Darcy's law to lateral or artesian subsurface flow.
- Estimates of lateral or artesian subsurface flow.

**Depth, Spacing, and Location.** The depth, spacing, and location of field ditches shall be based on site conditions, including soils, topography, ground water conditions, crops, land use, outlets, and saline or sodic conditions.

#### **Criteria Applicable to Collection or Interception of Excess Surface Water**

The capacity, size, depth, side slopes, and cross sectional area shall be based on the State Drainage Guide recommendations, if available. If local information is not available, use the information contained in NRCS National Engineering Handbook, Part 650, Engineering Field Handbook, Chapter 14, Water Management (Drainage).

#### **CONSIDERATIONS**

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

- 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.
- Permit free entry of water from adjacent land surfaces without causing excessive erosion.
- Permit crossing by field equipment if feasible.
- Provide effective removal or reuse of excess irrigation water.

- 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.
- Potential benefits of Drainage Water Management, including reduction of nutrient concentrations, improved plant productivity, and providing seasonal wildlife habitat.
- Potential effects of Drainage Water Management on downstream water temperatures 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 ditches.

#### **REFERENCES**

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

**Natural Resources Conservation Service  
Construction Specification**

**SURFACE DRAINAGE  
FIELD DITCH**

**1. SCOPE**

Work shall consist of excavating the field ditch and placing the excavated material as specified on the drawings or as staked in the field. The location of the planned ditch shall be as shown on furnished drawings or as staked in the field.

**2. SITE PREPARATION**

All trees, brush, stumps, and other objectionable material that will interfere with construction or proper functioning of the field ditch shall be removed and disposed of in an environmentally sound manner by burning, burying, or removing from the field area.

**3. DIMENSIONS OF INSTALLATION**

Field ditches shall be constructed to equal or exceed the width, depth, and cross sectional area dimension specified on the furnished drawings or as staked in the field. The depth shall be at or within 0.5 foot below the line and grade as staked in the field and have a positive slope toward the downstream outlet. Excessive over-excavation should be avoided to prevent greater than design velocity in the ditch when larger than design storms occur.

**4. EXCAVATION**

Ditches shall be excavated to a reasonably smooth surface. Spoil material shall be placed at locations shown on the plans and shall be spread to blend with the field surface. Permanent grass seed shall be applied to designated ditch and adjacent spoil areas.

Construction activities and spoil placement shall be carried on in a manner that will not restrict flow of surface water into the ditch.

Care must be taken to reduce and prevent sediment pollution of water.

**5. STRUCTURES**

Non-erosive entry of concentrated flow into the field ditch shall be provided for by shaping and grading or by constructing an appropriate grade stabilization structure or pipe inlet.

The field ditch outlet shall also be protected from erosion by shaping to the outlet channel or by constructing a grade stabilization structure.

**6. MEASUREMENT**

When the excavation and shaping are performed, the amount of work shall be determined on a linear foot basis. At least one representative cross section will be made to determine that design dimensions have been obtained. The linear distance shall be measured to the nearest 1 foot along the centerline of the ditch. Payment shall include compensation for site preparation, excavation, shaping and finish grading.

Measurement for vegetative planting will cover the designated ditch and adjacent areas and will be measured to the nearest 0.1 acre. Payment shall include compensation for seedbed preparation, lime, fertilizer and seed; application of lime, fertilizer, and seed; and incorporation of seed.