



Natural Resources Conservation Service
CONSERVATION PRACTICE STANDARD
SURFACE DRAIN, FIELD DITCH

CODE 607

(ft)

DEFINITION

A graded channel on the field surface for collecting and conveying excess water.

PURPOSE

This practice is used to accomplish one or more of the following purposes:

- Intercept excess surface and shallow subsurface water from a field, conveying it to a surface main or lateral
- Collect excess irrigation water for a tailwater reuse system

CONDITIONS WHERE PRACTICE APPLIES

This standard applies to fields having one or more of the following conditions:

- Soils with low permeability or shallow barriers such as rock or clay, which impede percolation of water to a deep stratum
- Surface depressions or barriers that trap rainfall
- Areas of insufficient land slope to sufficiently move runoff water across the surface
- Excessive runoff or seepage from uplands
- Excessive irrigation water

CRITERIA

General Criteria Applicable to All Purposes

Plan, design, and construct the practice to comply with all Federal, State, Tribal, and local laws and regulations. The landowner is required to obtain all necessary permits prior to construction. The landowner/contractor is responsible for locating all buried utilities in the project area, including drainage tile and other structural measures.

Plan the field ditch as an integral part of the collection system for the field served. Design the field ditch to collect, intercept, and convey water to an outlet with continuity and without unacceptable ponding. Design the field ditch to permit free entry of water from adjacent land surfaces without causing excessive erosion.

If wetlands are present, complete an appropriate wetland determination per established procedures.

Investigate the site to ensure adequate outlets are available for discharge of collected water by gravity flow or pumping. Provide a stable, nonerosive outlet for the field ditch.

Location

Design field ditch pattern, length, and location based on topography. Install collection or interception ditches as required for effective removal of excess water.

Capacity

Size the capacity of the field ditch to adequately remove excess water, based on climatic and soil conditions and crop needs. Base the design capacity on the watershed area, topography, soil, and land use information. Use the appropriate drainage curves or coefficients. Compute the size of the field ditch using Manning's formula or another acceptable method.

Velocity

Design the field ditch to not exceed the maximum velocity contained in table 14.3 of NRCS National Engineering Handbook (Title 210) (NEH), Part 650, Chapter 14, "Water Management (Drainage)." Depending on the drain velocity, account for additional field ditch capacity from sediment accumulation expected through the life of the conservation practice.

Additional Criteria for Collection of Excess Surface Water**Capacity**

Base the depth, spacing, and location of field ditches on site conditions. Include soils, topography, ground water conditions, crops, land use, outlets, and saline or sodic conditions. Use hydrologic models as appropriate to the conditions.

Additional Criteria for Interception of Excess Shallow Subsurface Water**Capacity**

Determine the required capacity using one or more of the following methods:

- Application of drainage coefficients to the acreage drained taken from the State drainage guide, if available. Include added capacity required to convey the calculated volume of surface water.
- Measured rate of shallow subsurface flow at the site during a period of adverse precipitation and ground water conditions.
- Estimates of locally tried and proven lateral shallow subsurface flow rates.

Depth, spacing, and location

Base the capacity, size, depth, side slopes, and cross-sectional area on the State drainage guide recommendations, if available. If State or local information is not available, use the information contained in 210-NEH, Part 650, Chapter 14, "Water Management (Drainage)."

Additional Criteria for Collection of Excess Irrigation Water

Base the capacity, size, depth, side slopes, and cross-sectional area on guidance in the State irrigation guide or local information of potential runoff volume for the current irrigation system.

Apply all reasonable measures to minimize irrigation runoff.

Account for additional capacity from surface runoff that occurs outside the irrigation season, if that runoff water is available for collection.

CONSIDERATIONS

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

- Establish ditches, in straight or nearly straight courses as topography and property boundaries permit. Use random alignment to follow depressions and isolated wet areas of irregular or undulating topography. Avoid excessive cuts and the creation of small irregular fields.
- Allow crossing by field equipment if needed and feasible.
- 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.
- Effects on wetlands or water-related wildlife habitats.
- Potential benefits of drainage water management, including nutrient concentration reductions, improved plant productivity, and enhancement of seasonal wildlife habitat.
- Potential effects of drainage water management on downstream water temperatures or soil salinity.
- The need for riparian buffers, filter strips, and fencing.
- Effects on water budget components, especially the relationships between runoff and infiltration.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for constructing the field ditch. Describe the requirements for installing the practice that achieves its intended purpose.

Provide instruction in the specification or on the drawings that the landowner or operator is responsible for securing all required permits or approvals and for performing in accordance with such laws and regulations. The landowner/contractor is responsible for locating all buried utilities in the project area, including drainage tile and other structural measures.

As a minimum, the plans and specifications include—

- A cover sheet with utility notification responsibilities and location map.
- A plan view showing the benchmark locations and descriptions. Include the planned field ditch locations and sufficient site features the layout will be accurate.
- A typical section of the surface drains and elevation information on the construction drawings.
- Information about grade, spacing, and outlet erosion protection as needed.
- Location of utilities and notification requirements.
- Areas identified needing vegetative establishment after construction.
- Indication of the area to dispose of excavated materials.

OPERATION AND MAINTENANCE

Provide a site-specific operation and maintenance plan to the landowner or operator prior to installing the practice. As a minimum, include guidance in the plan for—

- Routine maintenance and operational needs of the ditch. Maintain ditch cross-section and gradient.
- Periodic and post-storm inspection to detect and minimize damage to the field ditch.
- Periodic removal of sediment and other debris.
- Periodic control of vegetative materials.
- Proper control of livestock access.

REFERENCES

USDA NRCS. 2001. National Engineering Handbook (Title 210), Part 650, Chapter 14, Water Management (Drainage). Washington, D.C. <https://directives/sc/egov/usda/gov/>