

SURFACE DRAINAGE, FIELD DITCH

(Feet)
Code 607

Natural Resources Conservation Service
Conservation Practice Standard

I. Definition

A graded ditch for collecting excess water in a field.

II. Purpose

To 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; and collect or intercept excess subsurface water and carry it to an outlet.

III. Conditions Where Practice Applies

This practice is applicable on sites that are flat or nearly flat and:

- 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.
- 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.
- Have adequate outlets available for disposal of drainage water by gravity flow or pumping.

This practice does not apply to NRCS Field Office Technical Guide (FOTG), Section IV, Standard 608, Surface Drainage, Main or Lateral; or 412, Grassed Waterway.

IV. Federal, State, and Local Laws

Users of this standard should be aware of potentially applicable federal, state, and local laws, rules, regulations, or permit requirements governing surface drainage field ditches. This standard does not contain the text of federal, state, or local laws.

V. Criteria

The following criteria apply to all purposes.

A. General

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.

B. Investigations

An adequate investigation shall be made of all sites. On-site soil borings shall be conducted and documented on all sites.

C. 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.

D. Design

The size, depth, side slopes, grade and cross section of the field ditch shall:

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

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

E. Capacity

The ditch will have sufficient capacity to carry flow for the selected drainage curve or coefficient. Minimum drainage curves are shown in Figure 1. Design flow for the selected drainage curve will be determined from Chapter 14 of the NRCS National Engineering Handbook (NEH), Part 650, Engineering Field Handbook (EFH).

On watersheds having an average watershed slope steeper than 25 feet per mile (approximately 0.5%), the next higher runoff drainage curve than the one assigned the county will be used.

The capacity for the ditch should be determined using Manning’s Formula for nonvegetated channels or on retardance values for vegetated channels. Nonvegetated ditch capacity should be based on appropriate Manning’s “n” values of .04 or less. Ditches which are farmed with adjoining cropland may be considered nonvegetated ditches.

F. Design Velocity, Depth, Side Slopes, And Spacing

Permissible design velocities for nonvegetated channels are shown in Table 1. Ditches which are farmed with adjoining cropland may be considered nonvegetated ditches.

Table 1 - Permissible Bare Earth Velocities

Soil Texture	Maximum Velocity feet/second
Sandy and sandy loam	2.5
Silt loam	3.0
Sandy clay loam	3.5
Clay loam	4.0
Stiff clay, fine gravel, graded loam to gravel	5.0

The ditch depth should normally be 1 foot below the field elevation adjacent to the ditch. Depths less than 1 foot are permitted through short reaches of small depressional areas where flooding for short periods of time will not damage crops.

Guidelines for depth and spacing of open ditches used for internal drainage or water table control are contained in the NRCS Drainage Guide for Wisconsin.

Side slopes shall be 2:1 (2 horizontal to 1 vertical) or flatter in mineral soils and 1:1 or flatter in organic soils.

G. Spoil disposal

The spoil may be used to fill depressional areas or spread uniformly along the ditch. Openings will be left to provide inlets into the ditch for surface water. Spoil shall not be placed in wetlands or in areas that adversely affect wildlife habitat.

VI. Considerations

Additional recommendations relating to design that may enhance the use of, or avoid problems with, this practice but are not required to ensure its basic conservation functions are as follows.

- Downstream effects of erosion and yields of sediment and sediment-attached substances.
- Effects on the loadings of dissolved substances downstream.
- Potential changes in downstream water temperature.
- Effects on wetlands or other water-related wildlife habitat.
- Potential impacts on downstream flows or aquifers that would affect other water uses or users.
- Potential for uncovering or redistributing toxic materials.
- Impacts on cultural resources.
- The need for riparian buffers, filter strips, and fencing.

VII. 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.

VIII. Operation and Maintenance

An Operation and Maintenance Plan shall be developed with the landowner or operator that is consistent with the purposes of this practice, intended life of the components, and criteria for design.

IX. References

USDA, NRCS Wisconsin Field Office Technical Guide, Section IV, Conservation Practice Standards and Specifications.

USDA, NRCS National Engineering Handbook, Part 650, Engineering Field Handbook.

USDA, NRCS Drainage Guide for Wisconsin.

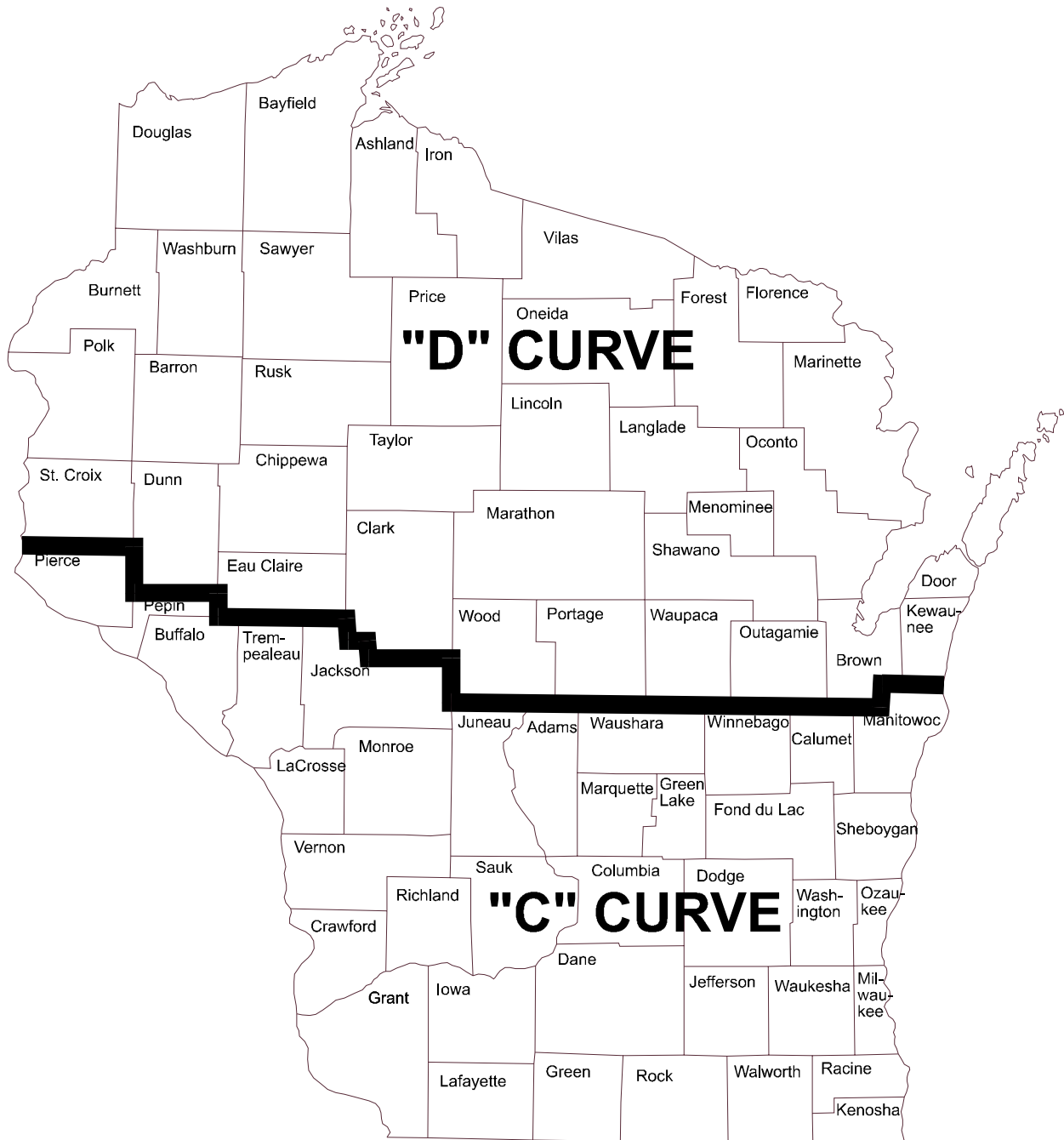


Figure 1

Wisconsin map showing applicable drainage curves for watersheds having an average slope of less than 25 feet per mile.