

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

FLOOD WATER DIVERSION

(Feet)

CODE 400

DEFINITION

A graded channel with a supporting embankment or dike on the lower side constructed on lowland subjected to flood damage.

SCOPE

This standard applies to the construction of a channel and embankment to divert floodwater. It does not apply to DIVERSIONS (362) or FLOODWAYS (404).

PURPOSE

To divert floodwater from lowlands by the construction of a graded channel on the lowlands.

CONDITIONS WHERE PRACTICE APPLIES

This practice is applicable if:

- Floodwater originating outside the lowland area to be protected is causing damage to agricultural land, crops or improvements, or is expected to cause damage to improvements to be made in the area.
- An adequate outlet for the design flow is available, either by gravity flow or by pumping. The outlet shall be suitable for the quality and quantity of water and sediment to be disposed of, with consideration of possible damages above or below the point of discharge that might involve legal actions under state law. The outlet may be a FLOODWAY (404), a natural channel, river or lake.

- Lands to be protected are suitable for agricultural use within their capabilities after installation of required conservation practices.
- All state laws and property rights regarding diversion or discharge of floodwaters are complied with.

This practice does not include diversions constructed on uplands which may provide benefits to bottom lands; or dams constructed to divert floodwaters into a waterspreading system, irrigation canal, or storage facility for beneficial use. A DIVERSION DAM (348) may discharge into a FLOODWATER DIVERSION (400).

DESIGN CRITERIA

Location

The floodwater diversion shall be located to protect the maximum area of lowland, consistent with economic limitations, topographic requirements, and the desired slope of the hydraulic gradeline.

In selecting the location for Floodwater Diversions, consideration shall be given to the preservation of existing fish and wildlife habitat, trees of significant value for wildlife food, dens or shelter and trees of significant aesthetic value. Where a Floodwater Diversion will adversely affect fish or wildlife habitat, mitigation measures acceptable to sponsors and concerned federal and state agencies shall be included in the plans.

Capacity

Floodwater diversions intended to protect agricultural land shall have capacity to carry the peak runoff from a 10-year frequency 24-hour duration storm. Where farmsteads, public roads, or other improvements are within the area to be

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FLOOD WATER DIVERSION (400)-2 Statewide

protected, the design capacity shall be consistent with the hazard involved but shall not be less than the peak flow from a 25-year frequency 24-hour duration storm.

Hydraulic Gradeline

The hydraulic gradeline of the floodwater diversion shall tie in to the elevation of water in the outlet expected for the frequency storm selected for design, and shall be established with due regard for damages which may occur on the opposite side of the floodwater diversion from the supporting embankment. The designed depth and grade shall result in a velocity that will not cause excessive erosion or sedimentation.

Cross Section

The design cross section shall be set below the design hydraulic gradeline. It shall include the total cross-sectional area bounded by the embankment, the berm between embankment and channel, the channel and the flow area on the opposite side of the channel.

This cross-sectional area shall be adequate for the design capacity based on Manning's formula. The roughness coefficient used in design shall be selected according to the conditions expected after the establishment of normal vegetation.

Velocity

Where provision can't be made for diversion of water from the practice until vegetation is established, an analysis will be made of the unvegetated condition, as well as the vegetated condition to evaluate for erosive velocities.

The maximum permissible design velocity shall be based on site conditions and determined by procedures described in Technical Release 25, Planning and Design of Open Channels. A desirable minimum velocity is 1.5 feet per second. On flat grades where the design velocity is below this value, the cross section shall be adjusted to obtain the most efficient section that depth and maintenance methods permit.

Berm and Embankment

The minimum berm width between channel and embankment shall be based on the depth of channel as shown in the following table:

Depth of Channel	Minimum Berm
feet	feet
2-4	4
4-6	6
6-8	10
over 8	15

Wider berms than the above should be used where site conditions permit.

The embankment may be constructed from the channel excavation or from suitable borrow.

The design height of the embankment shall be the design water depth plus a freeboard of at least 2 feet. The constructed height shall be the design height plus an allowance for settlement based on consideration of soil material and the anticipated compaction during construction but such allowance shall be no less than 5 percent of the design height.

The minimum cross section of embankment where fill is compacted by hauling or special equipment shall be:

Compacted Fills

Design Water Height	Minimum Top Width	Steepest Side Slope
feet	feet	
0-6	6	1.5:1
6-12	8	2:1

Where soils or water conditions make it impractical to compact the embankment with hauling or special equipment, dumped fill may be used and shall have minimum cross section dimensions incorporated within the fill as follows:

Dumped Fills

Design Water Height	Minimum Top Width	Steepest Side Slope
feet	feet	
0-6	6	2:1
6-12	8	2.5:1

Side slopes of 3:1 on water side and 2:1 on land side may be used instead of 2.5:1 for both slopes.

Vegetative Cover

An adequate protective cover of grasses shall be established on the embankment where, in the judgment of the responsible technician, this is necessary to protect against erosion by flood flows, wave action, or from rainfall and runoff on the embankment. Seedbed preparation, seeding, sprigging, or sodding, fertilizing, mulching, and fencing shall comply with the technical guide.

Maintenance Access

Maintenance access shall be provided as specified in the standard for OPEN CHANNELS (582).

PLANS AND SPECIFICATIONS

Plans and specifications for construction of Floodwater Diversions shall be in keeping with this standard and shall describe the requirements for construction to achieve the intended purpose. See page S-400-1 and Nebraska Construction and Material Specifications for additional items to be considered.