DIVERSION (FT)

Definition

A channel with a supporting ridge on the lower side constructed across the slope.

Scope

This standard applies to the installation of all diversions except FLOODWATER DIVERSION (400).

Purpose

To divert excess water from areas to sites where it can be used or disposed of safely.

Condition Where Practice Applies

This practice applies to sites where:

1. Runoff from higher lying areas is damaging cropland, pastureland, farmsteads, feedlots, or prevents the installation of conservation practices such as terraces or stripcropping.

2. Surface and shallow subsurface flow caused by seepage is damaging sloping upland.

3. Runoff or irrigation water is in excess and available for beneficial use on the same site or nearby sites.

4. A diversion is required as part of a waste management system.

5. A diversion is required to control erosion and runoff on urban or developed areas and construction sites.

General

Diversions shall not be substituted for terraces on land requiring terracing.

Diversions shall not be used below high sediment producing areas unless conservation practices or structural measures, designed to prevent damaging accumulations of sediment in the channels, are installed with or before the diversions.

In the planning and construction of diversions all state laws and regulations governing the diversion of water shall be strictly observed.

Level diversions shall be constructed only on deep soils that are capable of absorbing and storing extra water.

Design Criteria

Diversions protecting agricultural land must have the capacity to carry the peak runoff from a 10-year frequency storm as a minimum with a freeboard not less than 0.3 feet. Level diversions with closed ends shall have the storage capacity, without overtopping, to handle the expected runoff volume of a 10-year frequency storm with a freeboard of not less than 0.5 feet. Diversions designed to protect urban areas, buildings and roads, and these designed to function in connection with other structures, shall have enough capacity or storage to handle peak runoff or volume expected from a storm frequency consistent with the hazard involved, but not less than a 10-year frequency.

Height of level diversions with closed ends may be determined by the formula

$$H = \sqrt{SA/50} + \text{freeboard}$$ where:

H = settled height of ridge above natural ground in feet, including freeboard.
S = average slope of natural ground immediately above diversion.
A = cross-section of impounded area in square feet as determined by:

$$\frac{(3630)\ (\text{Drainage Area in AC})\ (\text{Volume Runoff in Inches})}{(\text{Length of Diversion in Feet})}$$

A. Cross Section

The channel may be trapezoidal, V-shaped, or parabolic. The ridge height shall include a settlement factor of 5 percent of flow depth plus freeboard. The ridge shall have a minimum width of 4 feet at the design elevation. The minimum effective height shall be equal to the designed flow depth as shown in tables in the Engineering Field Manual, or as determined by special design, plus freeboard and settlement, but shall not be less than 1 foot from the bottom of the channel to the top of the ridge.

Side slopes shall be designed to be practical and stable for the soil type and expected land use. Where the diversion is to be farmed, slopes and channel shall be designed to fit the farming equipment.

B. Grade and Velocity

Channel grades may be uniform or variable. Channel velocity shall not exceed that considered nonerosive for the soil and planned treatment. Permissible velocities are given in Nebraska design tables in Chapter 9 of the Engineering Field Manual.

C. Location

The location of the diversion shall be determined by outlet conditions, topography, land use, cultural operations, soil type, and length of slope.

A diversion in a cultivated field must be aligned to permit use of modern farming equipment.

D. Protection Against Sedimentation

If movement of sediment into the channel is a significant problem, a vegetated filter strip shall be used except where soil or other conditions preclude the use of such strips. Then the design shall include extra capacity for sediment and be supported by supplemental structures, cultural or tillage practices, or special maintenance measures.

E. Outlets

All diversions must have an adequate outlet. The outlet may be a grassed waterway, a permanent pasture or meadow, a grade stabilization structure, a stable water course, or an underground outlet. Vegetated outlets shall be established prior to construction, except, when the diversion will protect adjacent irrigated land or provide irrigation water control and it is desirable that both diversion and outlet be built at the time the land development work is done, and the grade of the outlet is not greater than 2 percent, then the diversion and outlet can be built concurrently. Diversion with underground outlets must have sufficient storage combined with release rate during the storm period, to insure that the design storm will not overtop the diversion ridge.

The design elevation of the water surface in the diversion shall not be lower than the design elevation of the water surface in the outlet at their junction when both are operating at design flow.

F. Vegetation

Disturbed areas that are not to be farmed shall be established to grass as soon as practicable after construction. If the soils or climatic conditions preclude the use of vegetation and protection is needed, nonvegetative means, such as mulches or rock, may be used. Seedbed preparation, seeding, fertilizing, and mulching shall comply with recommendations in CRITICAL AREA PLANTING (342). The sod shall be maintained and trees and brush controlled by chemical or mechanical means.

Plans and Specifications

Plans and specifications for installing diversions shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.