

NATURAL RESOURCES CONSERVATION SERVICE
ILLINOIS URBAN MANUAL
PRACTICE STANDARD

DIVERSION

(ft.)

CODE 815



(Source: NC Erosion and Sediment Control Field Manual)

DEFINITION

A channel and supporting ridge constructed across the slope to collect and divert runoff.

PURPOSE

The purpose of this practice is to divert excess surface water from one area for use or safe disposal in other areas.

CONDITIONS WHERE PRACTICE APPLIES

This permanent site development practice applies to areas where runoff can be diverted and used or disposed of safely to prevent flood damage, erosion, or sedimentation damage.

Specific locations and conditions include:

1. Above steep slopes to limit surface runoff onto the slope;
2. Across long slopes to reduce slope length to prevent gully erosion;

3. Below steep grades where flooding, seepage problems, or sediment depositions may occur;
4. Around buildings or areas that are subject to damage from runoff.

CRITERIA

Capacity - Diversions designed to protect areas such as minor buildings and roads, shall have enough capacity to carry the peak runoff expected from a storm frequency consistent with the hazard involved but not less than a 25-year frequency, 24-hour duration storm. Diversions designed to protect major structures, homes, school buildings and high capacity roads shall have enough capacity to carry the peak runoff from a 100-year frequency 24-hour duration storm.

Cross-section - The channel may be parabolic, V-shaped, or trapezoidal, and shall accommodate the equipment to be used for maintaining the diversion. The diversion shall be designed to have stable side slopes. Channel cut slopes shall not be steeper than 3:1. The slope

of a vegetated fill shall be 2:1 or flatter. The ridge height shall include an adequate settlement factor. Settlement allowance shall be 10% of design fill height or 0.2 feet, whichever is greater. The ridge shall have a minimum top width of 4 feet at the design elevation. In the case of diversions with a ridge, the design height of the ridge shall be 0.5 feet above the design water elevation. In the case of an excavated channel diversion, the lowest bank of the channel shall be 0.3 feet above the design water elevation. The minimum cross section shall meet the specified dimensions. The top of the constructed ridge shall not be lower than the design elevation plus the specified overfill for settlement.

Grade and velocity - Channel grades may be uniform or variable. Channel velocity shall not exceed that considered erosive for the soil and planned vegetation or lining. See table 1 for the maximum design velocities. Channel grades shall be sufficient to minimize standing water and wetness problems. If possible velocities 2 fps or higher should be used to avoid sedimentation. Compute velocity for bare earth channels using Manning's formula with "n" value of 0.035.

Location - The location of a diversion and outlet shall be in compliance with state drainage law, traditional case law precedent and local ordinances and regulations. Diversion location shall be dictated by outlet condition, topography, land use, length of slope, and soil type. Diversions shall not outlet on the right-of-way of a public road, highway, or other public utility without the written approval of the appropriate authorities.

Sedimentation - Diversions should not be used below high sediment producing areas unless land treatment practices or structural measures, designed to prevent damaging accumulations of sediment in the channels, are installed with or before the diversions. If movement of sediment into the channel is a significant problem, a vegetated filter strip meeting the requirements of practice standard FILTER STRIP 835 shall be used where soil or climate does not preclude its use. Then, the design shall include extra capacity for sediment and be supported by supplemental structures, cultural or tillage practices, or special maintenance measures.

Outlets - Each diversion must have a safe and stable outlet with adequate capacity. Examples of acceptable outlets include but are not limited to GRASS LINED CHANNELS 840, IMPOUNDMENT STRUCTURE - FULL FLOW 841, IMPOUNDMENT STRUCTURE - ROUTED 842, INFILTRATION TRENCH 847, LEVEL SPREADER 870, and ROCK OUTLET PROTECTION 910. The outlet must convey runoff to a point where outflow will not cause damage. Vegetative outlets shall be installed prior to and have vegetation adequately established in the outlet channel before diversion construction. Underground outlets consist of an inlet and underground conduit. Underground outlets shall meet the requirements of the practice standard SUBSURFACE DRAIN 945. The release rate when combined with storage is to be such that the design storm will not overtop the diversion ridge. On large watersheds, runoff flows are usually too large to outlet entirely through underground outlets.

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.

Vegetation - Disturbed areas shall be established to vegetation as soon as practicable, generally within 15 days after construction is complete. If the soils or climatic conditions preclude the use of vegetation for erosion protection, non-vegetative linings such as gravel, rock riprap, or cellular block may be used. Seedbed preparation, seeding, fertilizing, and mulching shall comply with the practice standards PERMANENT VEGETATION 880 and MULCHING 875. The vegetation shall be maintained and trees and shrubs controlled by hand, machine, or chemicals.

Sediment-laden water should first be directed through an approved sediment-trapping device before entering receiving surface waters. Examples of acceptable sediment trapping facilities include but are not limited to practice standards IMPOUNDMENT STRUCTURE - ROUTED 842 and TEMPORARY SEDIMENT TRAP 960.

CONSIDERATIONS

Diversions should be planned as a part of initial site development. They are principally runoff control measures that subdivide the site into specific drainage areas. Permanent diversions can be installed as temporary diversions until the site is stabilized, then completed as a permanent measure, or they can be installed in final form during the initial construction operation. The amount of sediment anticipated and the

maintenance required as a result of construction operations will determine which approach should be used. Stabilize permanent diversions with vegetation or materials such as riprap, paving stone, or concrete as soon as possible after installation. Base the location, type of stabilization, and diversion configuration on final site conditions. Evaluate function, need, velocity control, outlet stability, and site aesthetics. When properly located, landforms such as landscape islands, swales or ridges can be used effectively as permanent diversions. Base the capacity of a diversion on the runoff characteristics of the site and the potential damage after development. Consider designing an emergency overflow section or bypass area to limit damage from storms that exceed the design storm. The overflow section may be designed as a weir with riprap protection.

A typical diversion cross-section consists of a channel and a supporting ridge. In the case of an excavated type diversion, the natural ground serves as the diversion ridge. Diversion cross sections must be adapted to the equipment that will be used for their construction and maintenance. The channel may be natural, parabolic or trapezoidal in shape; use of "V" channels is generally discouraged due to erosion problems experienced.

At all points where diversion ridges or channels will be crossed by construction equipment, the diversion should be protected according to requirements of the practice standard STABILIZED CONSTRUCTION ENTRANCE 930. Bridges or culverts of adequate capacity may also be used.

Subsurface drainage should be used along permanent vegetated diversion channels when adequate grade can not be achieved to prevent ponding water, when hillside seeps or soils with poor internal drainage keep the channel wet or when base flow is intercepted by the diversion.

every major rainfall and any needed repairs made promptly.

NRCS IL March 1994

urbst815.doc

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 function. At a minimum include the following items:

1. Diversion location.
2. Channel grade.
3. Diversion cross-sections.
4. Seeding and fertility rates.

All plans shall include the installation, inspection, and maintenance schedules with the responsible party identified.

Construction of the diversion shall meet the requirements as listed in the construction specification 27 DIVERSIONS AND WATERWAYS. Standard drawing IL-515 DIVERSION PLAN may be used as the plan sheet.

OPERATION AND MAINTENANCE

A maintenance program shall be established to maintain diversion capacity, storage, ridge height, vegetation and outlet. Maintenance needs are to be discussed with the landowner or operator who is responsible for maintaining the practice. Diversion ridges can be hazardous for mowing. Any hazards must be brought to the attention of the responsible party. Diversions should be inspected after

TABLE 1 - MAXIMUM PERMISSIBLE DESIGN VELOCITIES

Soil Texture	Channel Vegetation Retardance and Cover	Permissible Velocity (ft./sec.) ^{1/}
Sand, silt, sandy loam, silt loam, loamy sand (ML, SM, SP, SW)	B - Tall fescue, smooth bromegrass	3.5
	C - Kentucky bluegrass, redtop, red fescue	3.0
	D - Annuals ^{2/} , small grain (rye, oats, wheat, ryegrass)	2.5
	E - Bare channel	1.5
Silty clay loam, sandy clay loam (ML-CL, SC)	B - Tall fescue, smooth bromegrass	4.5
	C - Kentucky bluegrass, redtop, red fescue	4.0
	D - Annuals ^{2/} , small grain (rye, oats, wheat, ryegrass)	3.5
	E - Bare channel	2.0
Clay (CL)	B - Tall fescue, smooth bromegrass	5.5
	C - Kentucky bluegrass, redtop, red fescue	5.0
	D - Annuals ^{2/} , small grain, (rye, oats, wheat, ryegrass)	4.0
	E - Bare channel	2.0

^{1/} To be used only in stabilized protected areas.

^{2/} Annuals – use only as temporary protection until permanent vegetation is established.