Diversion - DI

DEFINITION

A channel of compacted soil constructed above, across, or below a slope, with a supporting earthen ridge on the lower side.

PURPOSE

To reduce the erosion of steep, or otherwise highly erodible areas by reducing slope lengths, intercepting storm runoff and diverting it to a stable outlet at a non-erosive velocity, or to convey storm water through a construction site.

CONDITIONS

This standard applies to temporary and permanent diversions in land-disturbing activities. Diversions are applicable where:

- The slope length needs to be reduced to minimize erosion.
- Runoff from upslope areas is, or has the potential for, damaging property, flooding, or preventing the establishment of vegetation on lower areas.
- Clean storm water is coming onto the site and needs to be conveyed across or around the disturbed area to prevent contamination.

DESIGN CRITERIA

Professionals familiar with the design of storm water conveyance systems should prepare construction plans and drawings for diversion designs. A diversion consists of two components: the ridge and the channel.

Ridge Design: The ridge should be compacted and designed to have stable side slopes, which should not be steeper than 2:l. When maintenance by machine mowing is planned, side slopes should be no steeper than 3:1. The ridge should be a minimum width of four feet at the design water elevation after settlement. Its design should allow for ten percent settlement.

Channel Design: Land slope must be taken into consideration when choosing channel dimensions. On the steeper slopes, narrow and deep channels may be required. On the more gentle slopes, broad, shallow channels

usually are applicable. The wide, shallow section will be easier to maintain. Since sediment deposition is often a problem in diversions, the designed flow velocity should be kept as high as the channel lining will permit. Unless the purpose of the diversion is to convey clean water around the disturbed area, a diversion should lead to a sediment-trapping device.

Table 1 lists minimum design criteria for diversions. The storm frequency is used to determine the required channel capacity (peak rate of runoff).

The channel portion of the diversion may have a parabolic, trapezoidal, or vee-shaped cross-section, as shown in Figure 1. Professional design following sound engineering practice must be used to compute the capacity and dimension of the channel.

Location: Diversion location should be determined by considering outlet conditions, topography, land use, soil type, length of slope, seep planes (when seepage is a problem), and the development layout. Diversions should be tailored to fit the conditions for particular location and soil type(s).

Outlets: Each diversion must have an adequate outlet. The outlet may be a constructed or natural waterway, a stabilized vegetated area or another energy dissipation device. Refer to specification **Storm Drain Outlet Protection – OP**. In all cases, the outlet must discharge in such a manner as to not cause erosion or sedimentation problems. Protected outlets should be constructed and stabilized prior to construction of the diversion.

Stabilization: Channels should be stabilized in accordance with sound engineering practice to provide adequate stability for expected water velocities.

WATERBAR DIVERSIONS FOR ROADS

A detailed design is not required for this type of diversion. Diversions installed to divert water off a road or right-of-way should consist of a series of compacted ridges of soil running diagonally across the road at a 30º angle. Ridges are constructed by excavating a channel up-slope, and using the excavated material for the compacted ridge.

The compacted ridge height should be 8-12" above the original road surface; the channel depth should be 8- 12" below the original road surface. Channel bottoms and ridge tops should be smooth enough to be crossed by vehicular traffic. The maximum spacing between diversions is shown in Table 2. Waterbars should discharge to a stabilized conveyance that carries the storm water to an approved outlet or treatment structure.

CONSTRUCTION SPECIFICATIONS

1. All trees, brush, stumps, obstructions, and other objectionable material should be removed and disposed of so as not to interfere with the proper functioning of the diversion.

2. The diversion should be excavated or shaped to line, grade, and cross section as designed to meet the criteria specified herein and be free of irregularities that will impede normal flow.

3. All fills should be machine compacted as needed to prevent unequal settlement that would cause damage in the completed diversion.

4. All earth removed and not needed in construction should be spread or disposed of so that it will not interfere with the functioning of the diversion.

5. Diversion channels should be stabilized in accordance with designed plans and specifications.

INSPECTION

Inspections of erosion control measures should be made before anticipated storm events (or series of storm events such as intermittent showers over one or more days) and within 24 hours after the end of a storm event of 0.5 inches or greater, and at least once every fourteen calendar days. Where sites have been finally or temporarily

stabilized, such inspection may be conducted only once per month.

MAINTENANCE

Maintenance needs identified in inspections or by other means should be accomplished before the next storm event if possible, but in no case more than seven days after the need is identified.

Diversion Design Criteria

Diversion Type	Land or Improvement Protected	Storm Frequency	Freeboard	Minimum Ridge Width
Temporary	Construction Areas	2yr / 24 hr	0.3	4 feet
Permanent	Landscaped, recreation and similar areas	25yr / 24hr	0.3	4 feet
Permanent	Dwellings, schools, commercial bldgs., and similar installations	50yr / 24hr	0.5	4 feet

Table 1

Source: GA SWCC

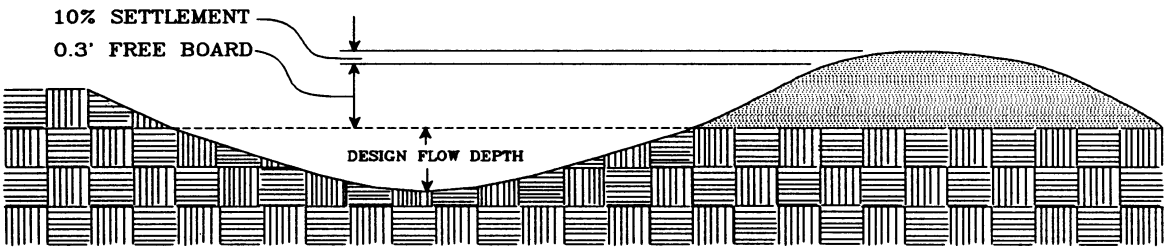
Maximum Spacing Between Waterbar Diversions

Road Grade (Percent)	Distance Between Diversions (Feet)
1	400
2	250
5	125
10	80
15	60
20	50

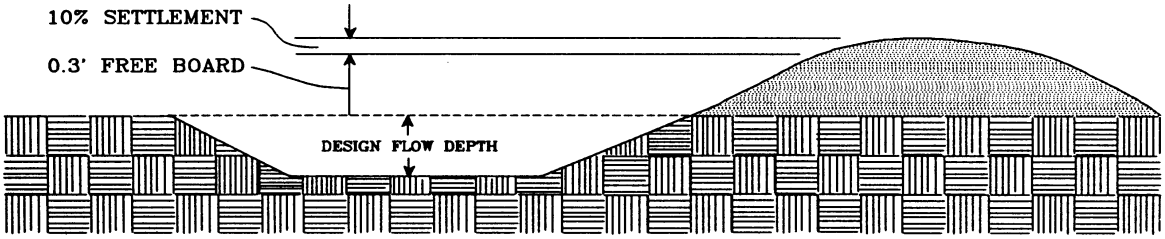
Table 2

Source: GA SWCC

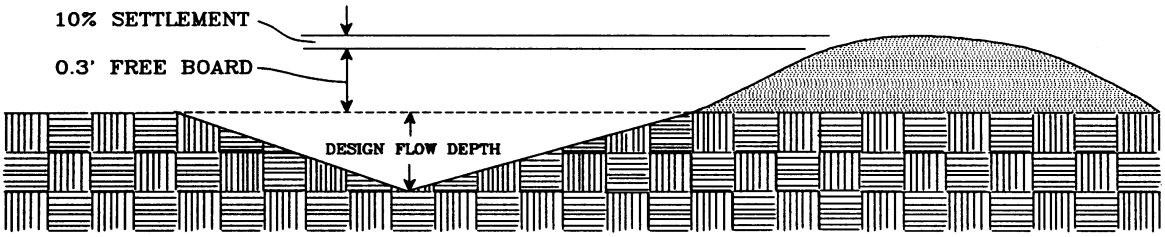
Typical Diversion Cross-Sections



Typical Parabolic Diversion



Typical Trapezoidal Diversion



Typical Vee-Shaped Diversion

Figure 1

Source: VA DSWC