

## Slope Drain - SD



### DEFINITION

A temporary pipe installed from top to bottom of a cut or fill slope.

### PURPOSE

To convey storm water runoff down the face of a cut or fill slope without causing erosion on or below the slope.

### CONDITIONS

Temporary slope drains are used where sheet or concentrated storm water flow could cause erosion as it moves down the face of a slope. These structures are removed once the permanent storm water disposal system is installed.

### DESIGN CRITERIA

Formal design is not required. The following standards should be used:

**Placement:** The temporary slope drain should be located on undisturbed soil or well-compacted fill.

**Diameter:** The diameter of the temporary slope drain should provide sufficient capacity required to convey the maximum runoff expected during the life of the drain. Refer to Table 1 for selecting the pipe diameter of a slope drain.

### Slope Drain Pipe Specifications

Maximum Drainage Area Per Pipe (acre)	Pipe Diameter (inches)
0.3	10
0.5	12
1	18

Table 1

Source: GA SWCC

**Slope Drain Inlet and Outlet:** See Figure 1 for typical slope drain details. Diversion structures are used to route runoff to the slope drain's "Tee" or "El" inlet at the top of the slope. The entrance section should slope toward the entrance to the slope drain at a minimum of 1/2-inch per foot. Thoroughly compact selected soil around the inlet section to prevent the pipe from being washed out by seepage or piping. A stone

filter ring or other inlet protection may be placed at the inlet for added sediment filtering capacity. Refer to the specifications **Filter Ring - FR** or **Storm Drain Inlet Protection - IP**. These sediment-filtering devices should be removed if flooding or bank over wash occurs.

Rock riprap should be placed at the outlet for energy dissipation. A Tee outlet, flared end section, or other suitable device may be used in conjunction with the riprap for additional protection. Refer to **Storm Drain Outlet Protection - OP**.

**Pipe Material:** Design the slope drain using heavy-duty, flexible materials such as non-perforated, corrugated plastic pipe or specially designed flexible tubing. Use reinforced, hold-down grommets or stakes to anchor the pipe at intervals not to exceed 10 feet with the outlet end securely fastened in place. The pipe must extend beyond the toe of the slope.

## CONSTRUCTION SPECIFICATIONS

A common failure of slope drains is caused by water saturating the soil at the inlet section and seeping along the pipe. This creates voids and piping to occur, causing washouts. Proper back filling around and under the pipe with stable soil material, and hand compacting in 6-inch lifts to achieve firm contact between the pipe and the soil at all points, will eliminate this type of failure.

1. Place slope drains on undisturbed soil or well-compacted fill.
2. The entrance section should slope toward the inlet to the slope drain at a minimum of 1/2-inch per foot.
3. Hand compact the soil under and around the inlet and exit sections in lifts not to exceed 6 inches.
4. Ensure that the fill used to anchor the slope drain inlet at the top of the slope has minimum dimensions of 1.5 ft. depth, 4 ft. top width, and 3:1 side slopes.
5. Ensure that all slope drain connections are watertight.

6. Ensure that all fill material is well compacted. Securely fasten the exposed section of the drain with grommets or stakes spaced no more than 10 feet apart.

7. Place the drain slightly diagonally across the slope, extending the drain beyond the toe of the slope. Curve the outlet uphill and adequately protect the outlet from erosion.

8. If the drain is conveying sediment-laden runoff, direct all flows into a sediment trap or sediment basin.

9. Make the settled, compacted diversion no less than one foot above the top of the pipe at every point.

10. Immediately stabilize all disturbed areas following construction.

## INSPECTION

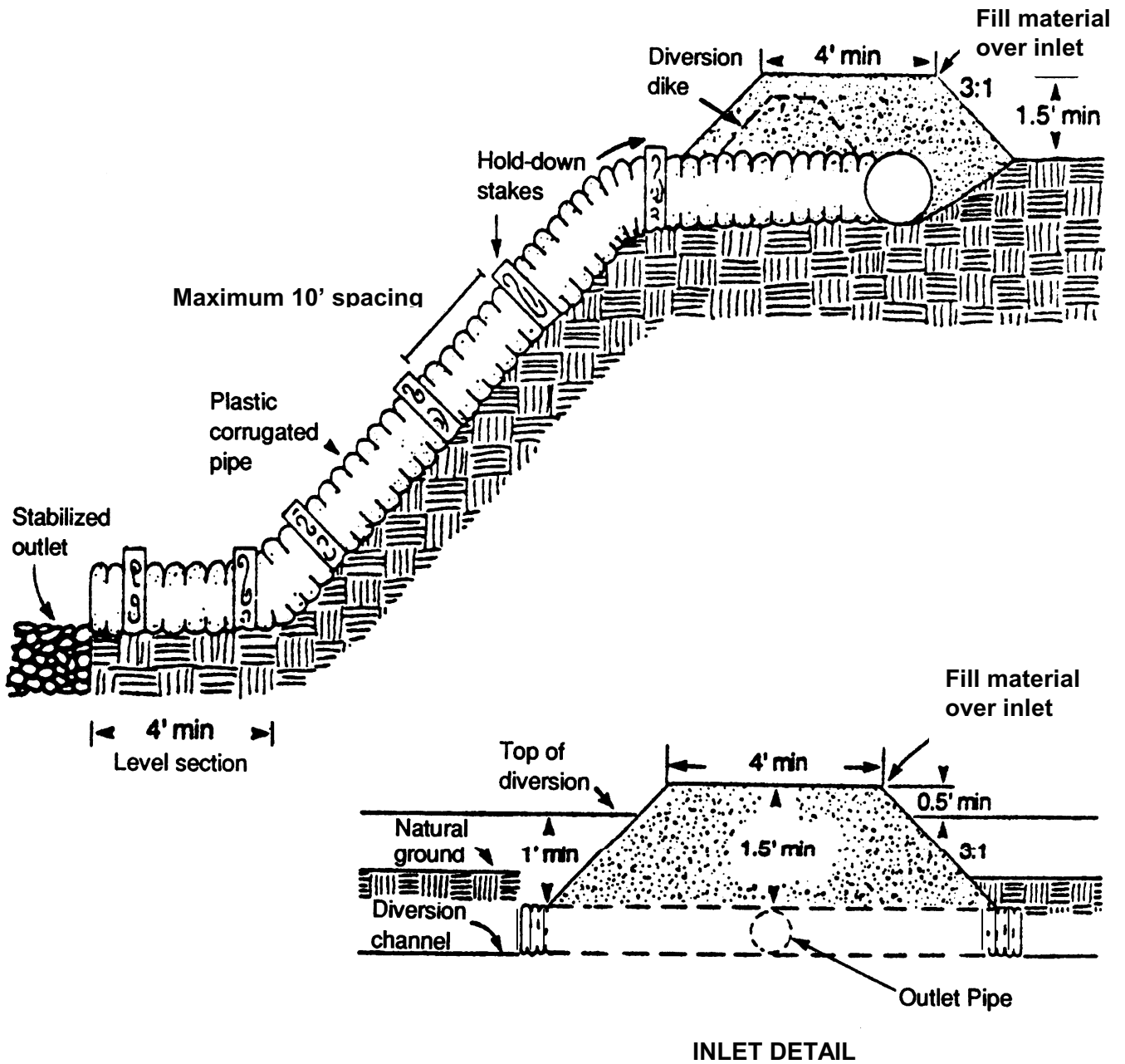
Inspections of the slope drain and supporting diversion should be made before anticipated storm events (or series of storm events such as intermittent showers over one or more days) and within 24 hours after the end of a storm event of 0.5 inches or greater, and at least once every fourteen calendar days.

## 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.

When the protected area has been permanently stabilized and the permanent storm water disposal system is fully functional, temporary measures may be removed, materials disposed of properly, and all disturbed areas stabilized appropriately. Refer to specifications **Disturbed Area Stabilization (With Permanent Vegetation and with Sod) - PS** and **SO**, respectively, and **Matting and Blankets - MA**.

## Slope Drain Pipe and Inlet Detail



Make all pipe connections watertight and secure so that the joints will not separate in use.

Figure 1

Source: GA SWCC