

Sediment Trap - **ST**



DEFINITION

A temporary ponding area formed by constructing an earthen embankment with a stone outlet.

PURPOSE

To detain sediment-laden runoff from small, disturbed areas long enough to allow the majority of the sediment to settle out.

CONDITIONS

Sediment traps should be used below disturbed areas where the total contributing drainage area is **less than 10 acres**. If the contributing drainage area is **10 acres or greater**, refer to **Sediment Basin - **SB****. The maximum useful life of the sediment trap should be no longer than 18 months.

Sediment traps, along with other controls intended to retain sediment, should be constructed as a first step in any land disturbing activity and should be made functional before upslope land disturbance takes place. The sediment trap may be constructed either independently or in

conjunction with a diversion. Refer to specification **Diversion - **D****.

Sediment should be periodically removed from the trap to maintain the required volume. The SWPPP should detail how excavated sediment is to be disposed of, such as by use in fill areas on site or removal to an approved off-site location.

DESIGN CRITERIA

Professionals familiar with the design of storm water basins should prepare construction plans and drawings. The trap should be designed using sound engineering practice.

Trap Capacity: The sediment trap should have an initial storage volume of 3618 cubic feet or 134 cubic yards per acre of drainage area, half of which should be in the form of a permanent pool or wet storage to provide a stable settling medium. The remaining half should be in the form of a draw down or dry storage that will provide extended settling time during less frequent, larger storm events. Excavation may be required to attain the necessary storage volume. The volume

of the wet storage should be measured from the low point of the excavated area to the base of the outlet structure. (See Figure 1) The volume of the dry storage should be measured from the base of the outlet to the crest of the outlet (overflow mechanism). Sediment should be removed from the basin when the volume of the wet storage is reduced by one-half.

For a sediment trap, the wet storage volume may be approximated as follows:

$$V_1 = 0.85 \times A_1 \times D_1$$

where,

V_1 = the wet storage volume in cubic feet

A_1 = the surface area of the flooded area at the base of the outlet in square feet

D_1 = the maximum depth in feet, measured from the low point in the trap to the base of the outlet

The dry storage volume may be approximated by the average end method as follows:

$$V_2 = [(A_1 + A_2)/2] \times D_2$$

where,

V_2 = the dry storage volume in cubic feet.

A_1 - the surface area of the flooded area at the base of the outlet in square feet

A_2 - the surface area of the flooded area at the crest of the outlet (overflow mechanism), in square feet

D_2 - the depth in feet, measured from the base of the outlet to the crest of the outlet

The designer should seek to provide a storage area that has a minimum 2:1 length to width ratio (measured from point of maximum runoff introduction to outlet).

Note: There are 27 cubic feet per cubic yard. Conversion between cubic feet and cubic yards is as follows:

number of cubic feet x 0.037 = number of cubic yards

or

number of cubic feet / 27 = number of cubic yards

Excavation: Side slopes of excavated areas should be no steeper than 1:1. The maximum depth of excavation within the wet storage area should be 4 feet to facilitate clean-out.

Embankment Cross-Section: The maximum height of the sediment trap embankment should be 5 feet as measured from the base of the stone outlet. Minimum top widths (W) and outlet heights (Ho) for various embankment heights (H) are shown in Figure 2. Side slopes of the embankment should be 2:1 or less.

Outlet: The outlet for the sediment trap should consist of a stone section of the embankment located at the low point in the basin. A combination of coarse aggregate and riprap should be used to provide for filtering/detention as well as outlet stability. The smaller stone should be TDOT #3, #357, or #5 Coarse Aggregate (smaller stone sizes will enhance filter efficiency) and riprap should be "Class A-1". See specification **Riprap – RR** for aggregate size tables.

Geotextile should be placed beneath the stone outlet, separating it from the subsoil surface. The geotextile should be placed immediately adjacent to the subgrade without any voids and extend five feet beyond the down stream toe of the outlet to prevent scour. Refer to specification **Geotextile – GE**.

The minimum length of the outlet should be 6 feet times the number of acres comprising the total area draining to the trap. See Figure 1 for further illustration. The crest of the stone outlet must be **at least 1.0 foot below the top of the embankment** to ensure that the flow will travel over the stone and not the embankment.

Removal: Sediment traps must be removed after the contributing drainage area is stabilized. The SWPPP should show how the site of the sediment trap is to be graded and stabilized after removal.

CONSTRUCTION SPECIFICATIONS

1. The area under the embankment should be cleared, grubbed, and stripped of any vegetation and root mat.
2. Fill material for the embankment should be free of roots or other woody vegetation, organic material, large stones, and other objectionable material. The embankment should be compacted in 6-inch layers by traversing with construction equipment.
3. All cut and fill slopes should be 2:1 or less (except for excavated, wet storage area which may be at a maximum 1:1 grade).
4. Construction operations should be carried out in such a manner that erosion during construction of the structure is minimized.
5. The earthen embankment should be seeded with temporary or permanent seeding immediately after installation. Refer to specification **Disturbed Area Stabilization (With Temporary Vegetation) - TS** and/or **(With Permanent Vegetation) - PS**.
6. The structure should be removed and the area stabilized when the upslope drainage area has been stabilized.

INSPECTIONS

Inspections of temporary sediment traps 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 inspections may be conducted only once per month.

The structure should be checked regularly to ensure that it is structurally sound and has not been damaged by erosion or construction equipment. The height of the stone outlet should be checked to ensure that its center is at least 1 foot below the top of the embankment.

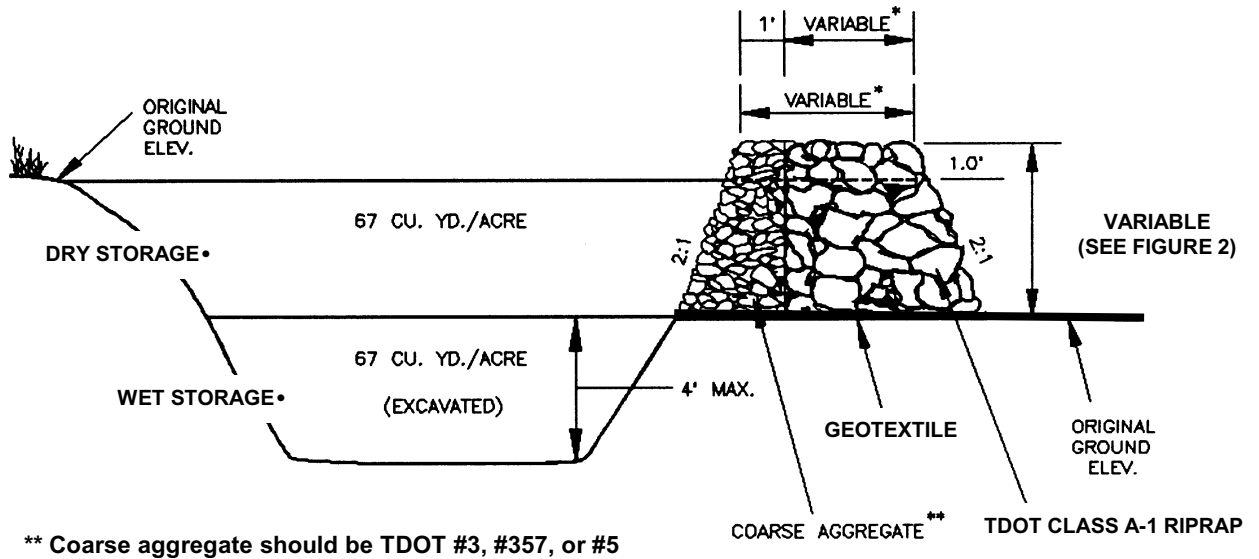
Filter stone should be checked to ensure that filtration performance is maintained. Stone choked with sediment should be removed and cleaned or replaced.

MAINTENANCE

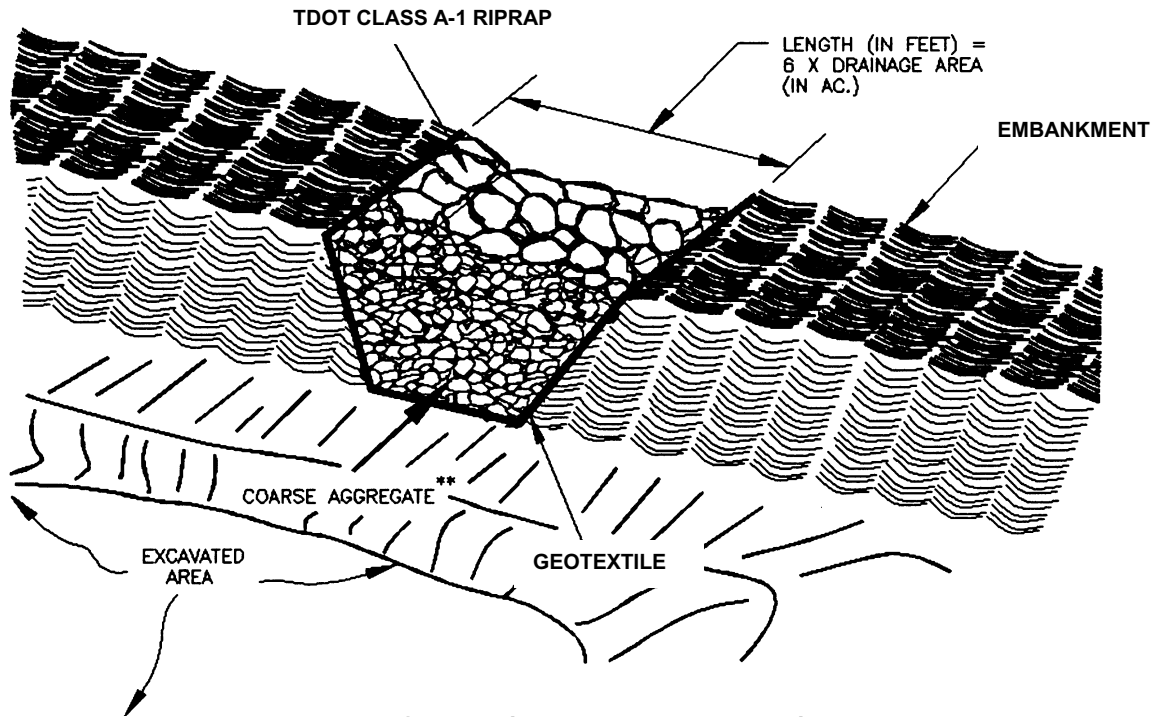
Sediment should be removed and the trap restored to its original dimensions when the sediment has accumulated to one half the design volume of the wet storage. Sediment removal from the basin should be deposited in a suitable area and in such a manner that it will not erode and cause sedimentation problems.

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.

Sediment Trap



Cross Section of Outlet



Outlet (Perspective View)

Figure 1

Source: VA DSWC

Minimum Top Width (W) Required for Sediment Trap Embankments According to Height of Embankment (Feet)

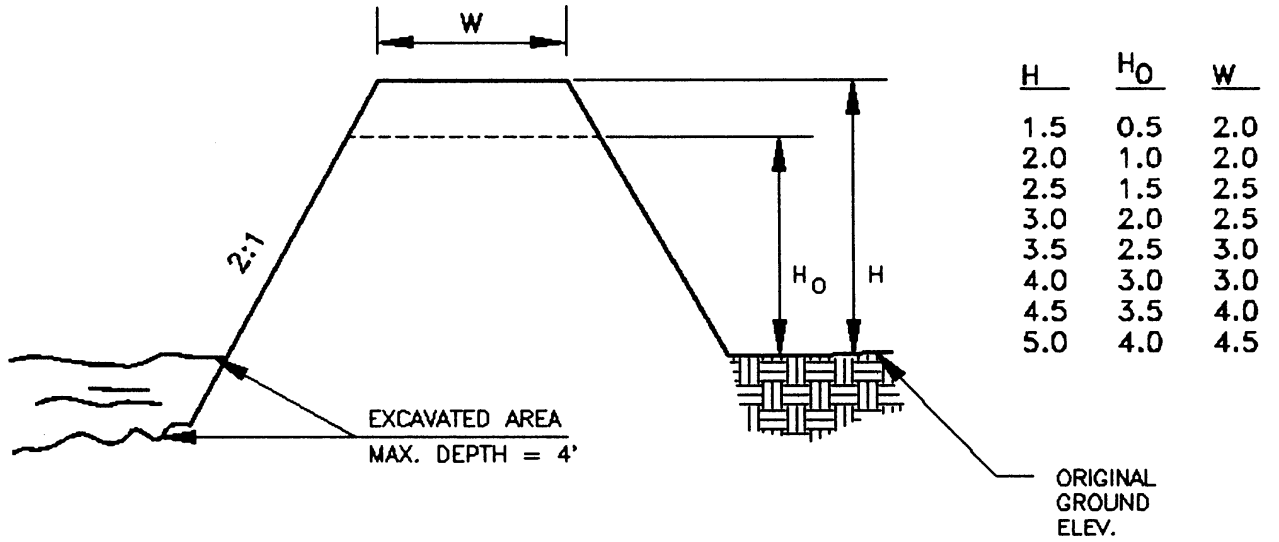


Figure 2

Source: VA DSWC