ST

Sediment Trap

Description

Sediment traps are small ponding containment areas that allow sediment to settle out of construction runoff. They are usually installed in a drainage way or right at or near the location that a disturbed area discharges. The length, width, and depth of the trap are dependent on project conditions, including the design storm. In areas with a potential for severe erosion, consider placing a series of traps, with spacing that maintains functionality.

Temporary diversions may also be used to direct runoff to the sediment trap. Sediment traps keep sediments on-site, preventing their runoff into the stormwater system and receiving streams. The traps are formed by excavating a small area or by placing an earthen embankment across a low area or drainage swale. An outlet or spillway is often constructed using large stones or aggregate to slow the release of runoff.

Selection Criteria

Sediment traps are commonly used at the outlets of stormwater diversion structures, channels, slope drains, construction site entrance wash racks, or any other runoff conveyance that discharges waters containing sediment and debris.

Sediment traps should be considered:

- At the perimeter of the site at locations where sediment-laden runoff is discharged offsite.
- At multiple locations within the project site where sediment control is needed.
- Around or upslope from storm drain inlet protection measures.
- On construction projects where the drainage area is less than 5 acres. Traps would be placed where sediment-laden stormwater may enter a storm drain or watercourse. Sediment Basins may be considered for drainage areas greater than 5 acres.
- As a supplemental control, sediment traps provide additional protection for a water body or for reducing sediment before it enters a drainage system.

Design Considerations

Sediment traps can simplify stormwater management on a construction site by trapping small amounts of sediment at multiple spots. Note the natural drainage patterns, and place the traps in areas with the highest erosion potential.

Design a sediment trap to maximize the surface area for infiltration and sediment settling. This increases the effectiveness of the trap and decreases the likelihood of backup during and after periods of high runoff intensity. Site conditions dictate specific design criteria; however, a good rule of thumb is the minimum storage capacity should be 1,800 ft3 per acre of total drainage area. The volume of a natural sediment

trap can be approximated using the following equation:

Volume (ft3) = 0.4 x surface area (ft2) x maximum pool depth (ft)

Siting sediment traps in sequence, and in combination with other erosion control devices can be a practical way of reaching the minimum storage capacity requirements (See Effective Volumes for Natural Sediment Traps Table below).

In the siting and design phase, take care to situate sediment traps for easy access by maintenance crews. This allows for periodic inspection and maintenance. When excavating an area for a sediment trap, it is recommended that the side slopes are no steeper than 2:1 and the embankment height no more than 5 feet from the original ground surface. Machine-compacting embankments ensures stability. To slow the flow rate from the trap, line the outlet with well-graded stone.

The spillway weir for each temporary sediment trap should generally be at least 4 feet long for a 1-acre drainage area and increase by 2 feet for each additional drainage acre added (up to a maximum drainage area of 5 acres).

Table 1: Appropriate Volumes for Natural Sediment Traps (side slopes 2:1)
(Examples with differing dimensions)

Shape	Depth (ft.)	Width (ft.) (top)	Length (ft.)	Volume (cubic ft.)	Effective Volume (cubic ft.)
Triangular	1	6	12	56	22
Trapezoidal (2 ft bottom)	2	10	20	480	192
Trapezoidal (4 ft bottom)	3	16	32	2340	936
Triangular	4	16	32	2496	998

Limitations

Generally, sediment traps are for drainage areas up to 5 acres. The effective life span of these structures is usually limited to 24 months. Although sediment traps allow eroded soils to settle, their detention periods are too short for removing fine particles like silts and clays.

Maintenance

The primary maintenance consideration for temporary sediment traps is removing accumulated sediment. Do this periodically to ensure that the trap continues to operate effectively. Remove sediments when the basin reaches about 50 percent sediment capacity. Inspect the sediment trap after each rainfall event to ensure that the trap is draining properly. Also check the structure for damage from erosion. Check the depth of the spillway and maintain it at a minimum of 1.5 feet below the low point of the trap embankment.

Effectiveness

Sediment trapping efficiency is a function of surface area and peak inflow rate. Traps that provide pools with large length-to-width ratios have a greater chance of success. Sediment traps have a useful life of about 18 to 24 months, but their effectiveness depends on the amount and intensity of rainfall and erosion and proper maintenance. USEPA estimates an average total suspended solids removal rate of 60 percent. An efficiency rate of 75 percent can be obtained for most Coastal Plain and Piedmont soils by using the following equation:

Surface area at design flow (acres) = (0.01) peak inflow rate (cfs)

Figure 1
Temporary Sediment Trap

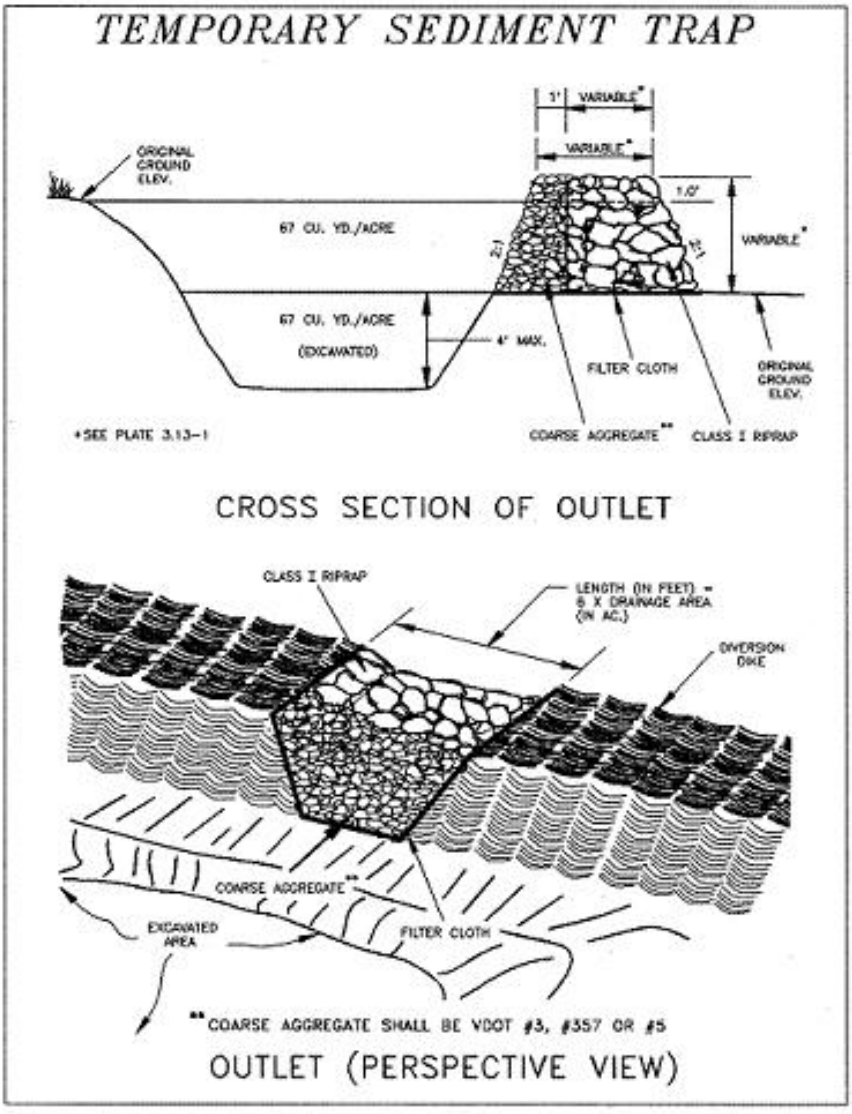

Photo 1
Sediment Trap

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