Sediment Traps

Source: Mississippi State University

BENEFITS

	L	M	H
Flow Control	■	■	■
Erosion Control			
Sediment Control	■	■	■
Runoff Reduction	■		
Flow Diversion			

Description: A sediment trap is a temporary structure that is used to detain sediment-laden runoff from small drainage areas (less than 5 acres) long enough to allow sediment to settle out. These devices are constructed by excavating a temporary pond to a pre-determined shape and volume. A stone weir or spillway most commonly controls flow from the structure.

Typical Uses: Used to remove suspended soil particles prior to releasing runoff from a construction site. Normally located at the lowest point of a construction site.

Advantages:
- One of the most useful and cost-effective measures for treating sediment-laden runoff.
- Helps control overall stormwater runoff for small storms, thus protecting streams and rivers.
- Relatively easy and cost-effective to construct.

Limitations:
- May be large and require a substantial amount of site area.
- Sediment traps may need to be eliminated prior to final stabilization on high-density sites because the occupied area is planned for development. This may make it difficult to keep the sediment trap functioning during the entire construction phase.
- Sediment traps are fairly ineffective at removing fine silts or clay particles.
- Not designed to treat runoff during intense rainfall events, which can re-suspend sediment within the trap.

Longevity: 18 months

SUDAS Specifications: Refer to Section 9040, 2.12 and 3.17

A. Description/Uses

Sediment traps are temporary sediment control structures or ponds, having a simple outlet structure stabilized with engineering fabric and rip rap. They are typically installed in a drainage way or other point of discharge downstream from a disturbed area.

Sediment traps are one of the most reliable measures for treating sediment-laden runoff from small construction sites and may be considered the primary method of sediment removal for many sites.

Sediment traps are highly effective at treating runoff from disturbed sites up to 5 acres. For larger sites, multiple traps are recommended. For disturbed areas greater than 10 acres, a sediment basin may be required (see Section 7E-12).

B. Design Considerations

Sediment trap volumes and dimensions should be sized according to the criteria in Section 7D-1. A storage volume of 3,600 cf should be provided for every acre of disturbed ground. This storage volume should be divided equally between wet storage and dry storage.

Sediment traps should be constructed at a low point, or at the point where concentrated flows leave the site. The location should be reviewed to ensure that the trap can be easily accessed for cleanout and maintenance, and that a failure of the sediment trap will not cause a loss of life or property. Sediment traps are often constructed in ditches or swales by excavating a small area to create a depression.

Construction phasing must be considered when locating sediment traps. As construction progresses, the sediment trap may need to be removed in order to complete the proposed improvements. Select a location which will allow the sediment trap to remain in service as long as possible. If construction phasing does not allow a sediment trap to remain in service until final stabilization, the trap may need to be relocated.

The outlet for a sediment trap normally consists of a stone embankment, through which the runoff flows. The embankment slows the rate and velocity of the runoff, creating a temporary pond, which allows sediment to settle out. Equations for calculating the flow through a porous medium, which would allow for exact sizing of the outlet, are available. However, these equations require that the porosity of the stone be known. In addition, an adjustment would need to be made to account for clogging of the voids over time. These criteria are difficult to determine, therefore, it is recommended that the width of the embankment be based upon the drainage area as indicated in the following table:

Table 7E-13.01: Embankment Widths for Sediment Traps

Contributing Drainage Area (acre)	**Embankment Width (feet)**
1	4
2	6
3	8
4	10
5	12

Source: Roberts, 1995 (FHWA)

The stone embankment should be located at the low point of the basin. The bottom of the stone embankment should equal the elevation of the top of the wet storage portion of the trap. The stone embankment serves two purposes. The porous nature of the crushed stone allows water to seep through the embankment, providing a means to dewater the dry storage volume of the trap after each rainfall event. The top of the embankment serves as an overflow spillway to control the outlet of flows during large storm events.

Construction of the stone embankment should begin by placing a layer of engineering fabric down to protect the underlying soils and help prevent them from being washed away. Next, erosion stone, or a similarly-sized material, is placed over the filter fabric to create an embankment of the height and width required.

C. Application

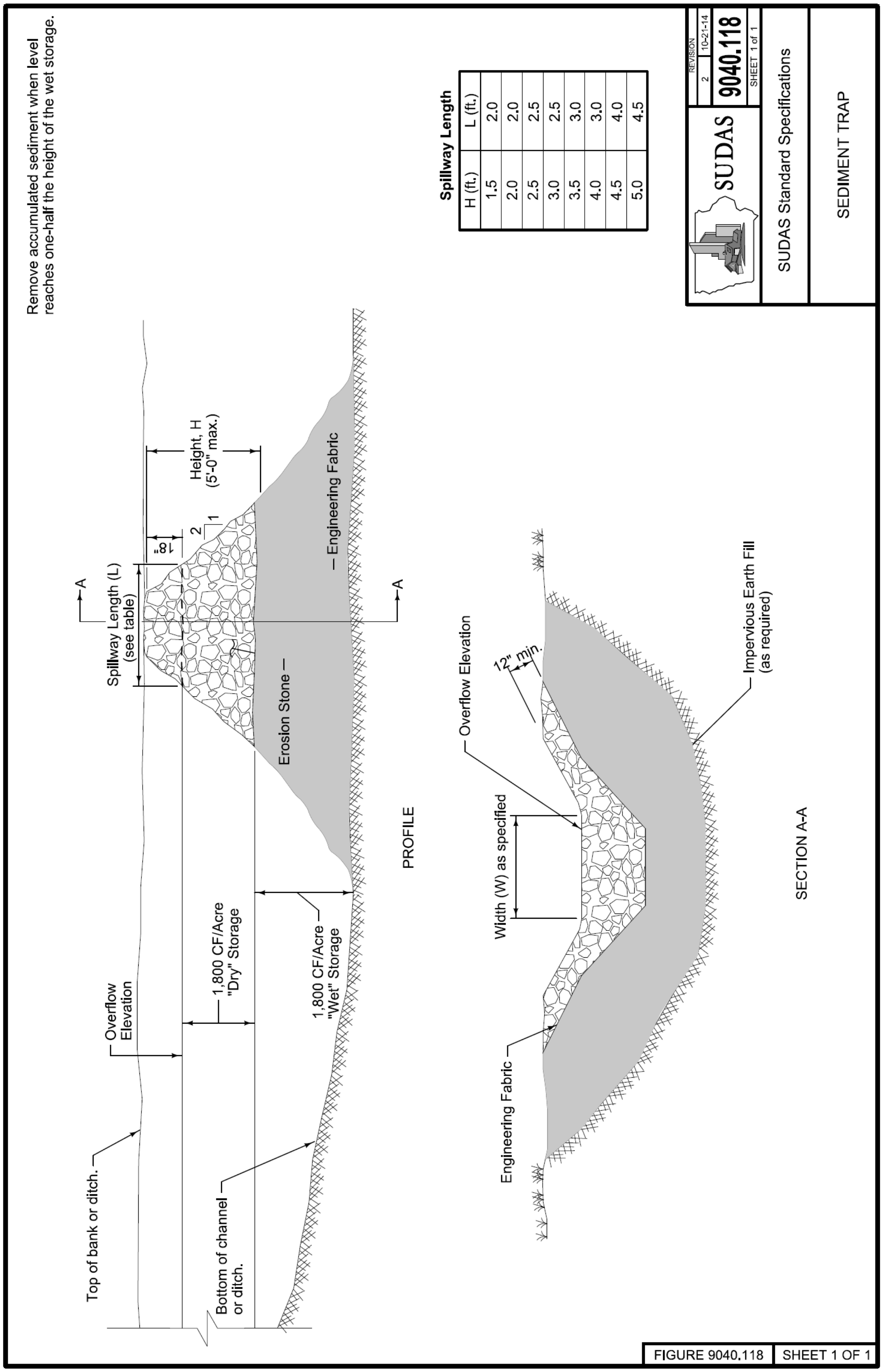
Sediment traps, in conjunction with other erosion control features, should be considered whenever more than 2 acres are disturbed. If more than 5 acres are disturbed, a sediment basin should be considered. If less than 2 acres are disturbed, sediment laden runoff may be controlled by other means such as silt fence or filtering products.

Sediment trap volumes and dimensions should be sized according to the criteria in Section 7D-1. 3,600 cf of storage should be provided for every acre of disturbed ground. This storage volume should be divided equally between wet storage and dry storage.

D. Maintenance

Sediment traps must be cleaned out as sediment accumulates within the trap. It is recommended to clean out the trap when it has lost one-half of the wet storage volume. Upon completion of the project, the trap area should be backfilled and stabilized. Alternatively, the trap may be converted to a permanent sediment basin or detention basin.

Figure 7E-13.01: Typical Sediment Trap with a Stone Outlet
(SUDAS Specifications Figure 9040.118)



H (ft.)	L (ft.)
1.5	2.0
2.0	2.0
2.5	2.5
3.0	2.5
3.5	3.0
4.0	3.0
4.5	4.0
5.0	4.5