

4.06 SILT FENCE
(ES BMP 1.06)

Definition
A temporary sediment barrier consisting of a filter fabric stretched across and attached to supporting posts and entrenches. There are two types. The silt fence is a temporary linear filter barrier constructed of synthetic filter fabric, posts, and, depending upon the strength of the fabric used, wire fence for support. The filter barrier is constructed of stakes and burlap or synthetic filter fabric.

- Purposes**
- To intercept and detain small amounts of sediment from disturbed areas during construction operations.
 - To decrease the velocity of sheet flows and low-to-moderate level channel flows.

Conditions When Practice Applies

- Below disturbed areas where erosion would occur in the form of sheet and rill erosion.
- Where the size of the drainage area is no more than 1/4 acre per 100 feet (1.3 ha /100 m) of silt fence length; the maximum slope length behind the barrier is 100 feet (30 m); and the maximum gradient behind the barrier is 50 percent (2:1).
- In minor swales or ditch lines where the maximum contributing drainage area is no greater than 2 acres (0.8 ha).
- Under no circumstances should silt fences be constructed in live streams or in swales or ditch lines where flows are likely to exceed one cubic foot per second (cfs) (0.03 m³/sec.). See Design Criteria for further clarification.

Planning Considerations

Silt fences can trap a much higher percentage of suspended sediments than can straw bales and may be preferable to straw barriers in many cases. While the failure rate of silt fences is lower than that of straw barriers, this failure rate is still due mainly to improper installation. The most effective application is to install two parallel silt fences spaced a minimum of three feet apart. The installation and maintenance methods outlined here can improve performance.

Filter barriers are inexpensive structures composed of burlap or standard weight synthetic filter fabric stapled to wooden stakes. Flow rates through burlap filter barriers are slightly slower and filtering efficiency is significantly higher than for straw bale barriers.

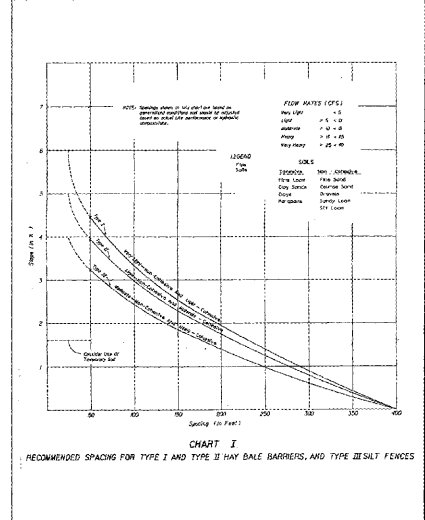


Plate 4.06a FDOT Standard Index 102, Chart 1
Source: FDOT Roadway and Traffic Design Standards

Silt Fences composed of a wire support fence and an attached synthetic filter fabric allow the flow rate significantly but have a higher filtering efficiency than burlap. Both woven and non-woven synthetic fabrics are commercially available. The woven fabrics generally display higher strength than the non-woven fabrics. When tested under acid and alkaline water conditions, most of the woven fabrics increase in strength. There are a variety of reactions among the non-woven fabrics. The same is true of fading under extensive ultraviolet radiation. Permeability rates vary regardless of fabric type. While all of the fabrics demonstrate very high filtering efficiencies for sandy sediments, there is considerable variation among both woven and non-woven fabrics when filtering the finer silt and clay particles.

Design Criteria

- No formal design is required for many small projects and for minor and incidental applications. For channel flow applications refer to FDOT Standard Index 102, Chart 1 (Plate 4.06a) for guidance on recommended spacing.
- Filter barriers shall have an expected usable life of 3 months. They are applicable in ditch lines, around drop inlets, and at temporary locations where continuous construction changes the earth contour and runoff characteristics and where low or moderate flows (not exceeding 1 cfs) (0.03 m³/sec.) are expected.
- Silt fences, because they have much lower permeability than burlap filter barriers, have their applicability limited to situations in which only sheet or overland flow is expected. They normally cannot filter the volumes of water generated by channel flows, and many fabrics do not have sufficient structural strength to support the weight of water ponded behind the fence. Their expected usable life is 6 months.

Construction Specifications

Materials

- Synthetic filter fabric shall be a pervious sheet of polypropylene, nylon, polyester, or polyethylene yarn. Synthetic filter fabric shall contain ultraviolet inhibitors and stabilizers to provide a minimum life of 6 months of expected construction life expectancy at 120°F (48°C).
- Burlap shall be burlap of a one yard (0.91 m) fabric.
- Posts for silt fences shall be either 1 1/2 inch (10 cm) diameter wood, or 1.33 pounds per linear foot (2 kg/m) steel with a minimum length of 5 feet (1.5 m). Steel posts shall have projection fasteners 6 to 8 inches (15 to 20 cm) to them.
- Stakes for filter barriers shall be 1" x 2" (2.5 x 5 cm) wood (preferred), or equivalent steel with a minimum length of 3 feet (90 cm).

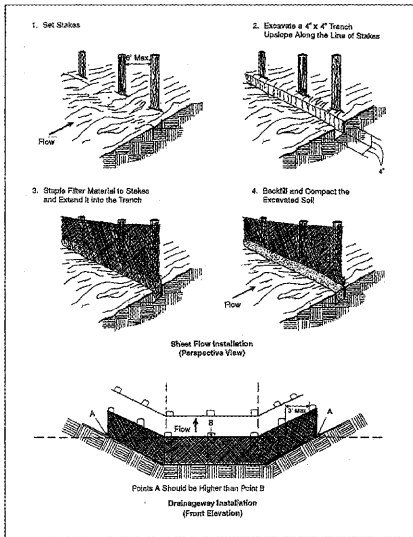


Plate 4.06b Construction of a Filter Barrier
Source: NRCGS

Sheet Flow Applications: Filter Barrier

This sediment barrier may be constructed using burlap or standard strength synthetic filter fabric. It is designed for low or moderate flows not exceeding 1 cfs. (0.03 m³/sec.). (See Plate 4.06b).

- The height of a filter barrier shall be a minimum of 18 inches (38 cm) and shall not exceed 18 inches (45 cm).
- Burlap or standard strength synthetic filter fabric shall be purchased in a continuous roll and cut to the length of the barrier to avoid the use of joints (and thus improve the strength and efficiency of the barrier).
- The stakes shall be spaced a maximum of 3 feet (90 cm) apart at the barrier location and driven securely into the ground a minimum of 8 inches (20 cm).
- A trench shall be excavated approximately 4 inches (10 cm) wide and 4 inches (10 cm) deep along the line of stakes and upslope from the barrier.
- The filter material shall be stapled to the wooden stakes, and 8 inches (20 cm) of the fabric shall be extended into the trench. Heavy duty wire staples at least 1/2 inch (13 mm) long, hog rings, or tie wire shall be used. Filter material shall not be stapled to existing trees.
- The trench shall be backfilled and the soil compacted over the filter material.
- Filter barriers shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.

Sheet Flow Application: Silt Fence

This sediment barrier uses standard strength or extra strength synthetic filter fabrics. It is designed for situations in which only sheet or overland flows are expected. (See Plate 4.06c).

- The height of a silt fence shall not exceed 36 inches (90 cm). Higher fences may impound volumes of water sufficient to cause failure of the structure.
- The filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are necessary, filter cloth shall be spliced as described in item No. 8 below.

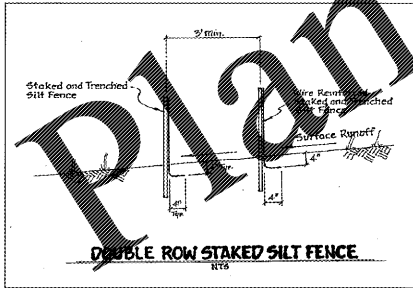


Plate 4.06c Double Row Staked Silt Fence
Source: Ready Oneak Improvement District

- Posts shall be spaced a maximum of 10 feet (3 m) apart at the barrier location and driven securely into the ground a minimum of 12 inches (30 cm). When extra strength fabric is used without the wire support fence, post spacing shall not exceed 6 feet (1.8 m).
- When standard strength filter fabric is used, a wire mesh support fence shall be fastened securely to the upslope side of the posts using heavy duty wire staples at least 1 inch (25 mm) long, tie wires, or hog rings. The wire shall extend into the trench a minimum of 2 inches (5 cm) and shall not extend more than 36 inches (90 cm) above the original ground surface.
- The standard strength filter fabric shall be stapled or wired to the fence, and 8 inches (20 cm) of the fabric shall be extended into the trench. The fabric shall not extend more than 36 inches (90 cm) above the original ground surface.

- When extra strength filter fabric and closer post spacing are used, the wire mesh support fence may be eliminated. In such a case, the filter fabric is stapled or wired directly to the posts with all other provisions of item No. 6 applying.
- When attaching two silt fences together, place the end post of the second fence inside the end post of the first fence. Rotate both posts at least 180 degrees on a clockwise direction to create a tight seal with the filter fabric. Drive both posts into the ground and bury the flap. (See Plate 4.06g).
- The trench shall be backfilled and the soil compacted over the filter fabric.
- The most effective application consists of a double row of silt fences spaced a minimum of three feet apart. The three foot separation is so that if the first row collapses it will not fall on the second row. Wire or synthetic mesh is may be used to reinforce the first row. (See Plate 4.06c).
- When used to control sediments from a steep slope, silt fences should be placed away from the toe of the slope for increased holding capacity. (See Plate 4.06f).
- Silt fences shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.

Channel Flow Applications

- If a filter barrier is to be constructed across a ditch line or swale, the barrier shall of sufficient length such that the bottom of the end sections of fence are higher in elevation than the top of the center section to eliminate end flow. The plan configuration shall resemble an arc or horseshoe with the ends oriented upslope. (See Plate 4.06b).
- Use FDOT Standard Index 102, Chart 1 (Plate 4.06a) as a guide for spacing.
- The remaining steps for installing a filter barrier for sheet flow applications apply here.

Maintenance

- Silt fences and filter barriers shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.
- Should the fabric on a silt fence or filter barrier decompose or become ineffective before the end of the expected usable life and the barrier still be necessary, the fabric shall be replaced promptly.
- Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-half the height of the barrier.

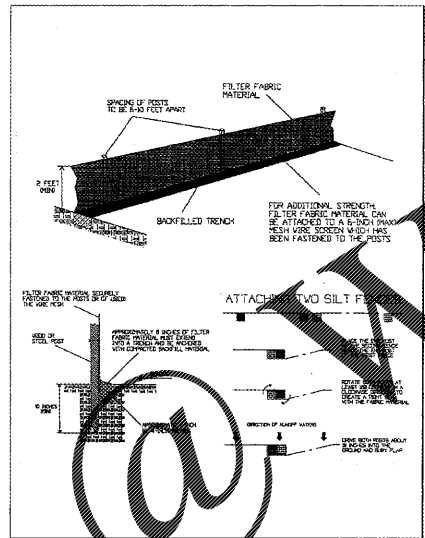


Plate 4.06d Installing a Filter Fabric Silt Fence
Source: HydroDynamics, Inc.

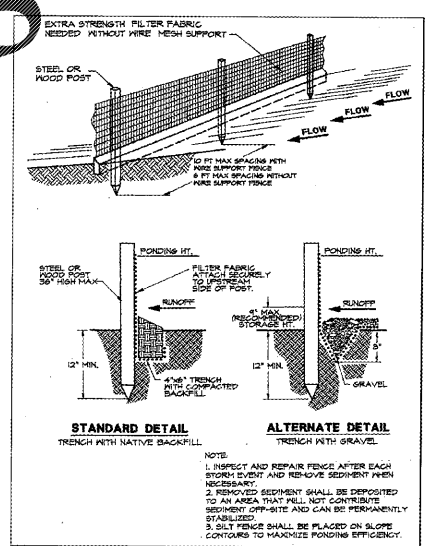


Plate 4.06e Silt Fence
Source: Erosion Drex

- Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required shall be dressed to conform with the existing grade, prepared, and seeded.

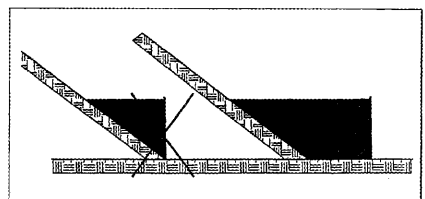


Plate 4.06f Proper Placement of a Silt Fence at the Toe of a Slope
Source: HydroDynamics, Inc.

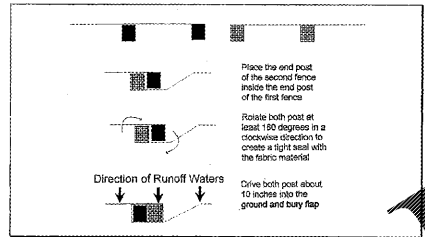


Plate 4.06g Attaching Two Silt Fences
Source: HydroDynamics, Inc.

4.03 TEMPORARY GRAVEL CONSTRUCTION ENTRANCE EXIT
(ES BMP 1.01)

Function

To stabilize and prevent points of vehicular ingress and egress on a construction site.

Purpose
To stabilize entrance to the construction site and reduce the amount of sediment transported onto public roads by motor vehicles or runoff.

Conditions Where Practice Applies

Whenever traffic will be leaving a construction site and moving directly onto a public road or other paved area.

Planning Considerations

Construction entrances provide an area where mud can be removed from construction vehicle tires before they enter a public road. If the action of the vehicle traveling over the gravel pad is not sufficient to remove most of the mud, then the tires must be washed before the vehicle enters a public road. If washing is used, provisions must be made to intercept the wash water and trap the sediment before it is carried off-site. Construction entrances should be used in conjunction with the stabilization of construction roads to reduce the amount of mud picked up by construction vehicles.

Design Criteria

Aggregate Size
FDOT No. 1 Coarse Aggregate (1.5 - 3.5 inch stone)(4 - 9 cm) should be used. Wood chips may be used for single family residential construction, provided that they can be prevented from floating away in a storm.

Entrance Dimensions

The aggregate layer must be at least 6 inches (15 cm) thick. It must extend the full width of the vehicular ingress and egress area. The length of the entrance must be at least 50 feet (20 m). The entrance must widen at its connection to the roadway in order to accommodate the turning radius of large trucks. (See Plate 4.03a)

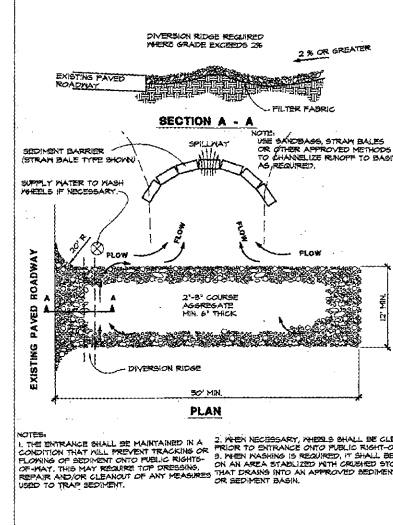


Plate 4.03a Temporary Gravel Construction Entrance
Source: Erosion Drex

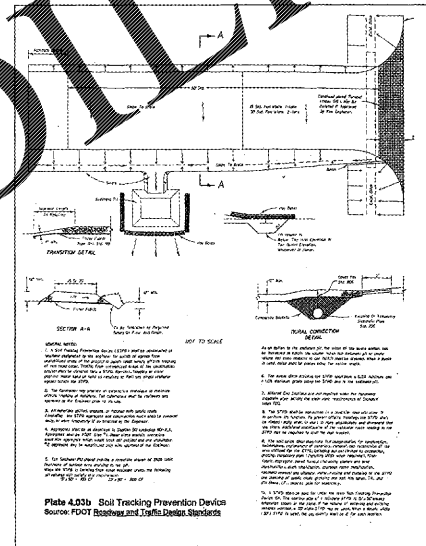


Plate 4.03b Soil Tracking Prevention Device
Source: FDOT Roadway and Traffic Design Standards

Location
If conditions on the site are such that most of the mud is not removed by the vehicles traveling over the gravel, then the tires of the vehicles must be washed before entering a public road. Wash water must be carried away from the entrance to a settling area to remove sediment (See Plate 4.03c). A wash rack may also be used to make washing more convenient and effective. (See Plate 4.03c).

Construction Specifications

The area of the entrance should be cleared of all vegetation, roots, and other objectionable material. A gradestix should be laid down to improve stability and simplify maintenance. The gravel shall then be placed over the gradestix to the specified dimensions.

Any drainage facilities required because of washing should be constructed according to approved specifications. If wash racks are used, they should be installed according to manufacturer's specifications.

Maintenance

The entrance shall be maintained in a condition which will prevent tracking or flow of mud onto public rights-of-way. This may require periodic top dressing with 2-inch (5 cm) stone, as conditions demand, and repair and/or clean out of any structures used to trap sediments. All materials spilled, dropped, washed, or tracked from roadways or into storm drains must be removed immediately. Look for signs of trucks and trailers equipment "cutting corners" where the gravel meets the roadway. Sweep the paved road daily for sediments and status.

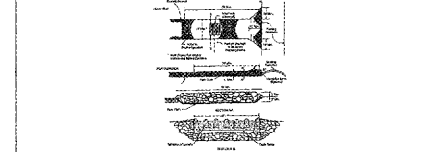
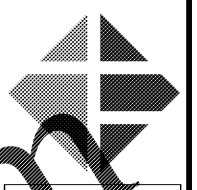
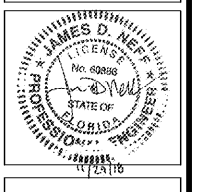


Plate 4.03c Construction Entrance with Wash Rack
Source: 1983 National Standards for Soil Erosion and Sediment Control



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