Silt Fences

Description


Silt fences prevent offsite transport of sediment.

Silt fences are used as temporary perimeter controls around sites where construction activities will disturb the soil. They can also be used around the interior of the site. A silt fence consists of a length of filter fabric stretched between anchoring posts spaced at regular intervals along the site at low/downslope areas. The filter fabric should be entrenched in the ground between the support posts. When installed correctly and inspected frequently, silt fences can be an effective barrier to sediment leaving the site in stormwater runoff.

Applicability

Silt fences apply to construction sites with relatively small drainage areas. They are appropriate in areas where runoff will occur as low-level flow, not exceeding 0.5 cfs. The drainage area for silt fences should not exceed 0.25 acre per 100-foot fence length. The slope length above the fence should not exceed 100 feet (NAHB, 1995).

Siting and Design Considerations

The material for silt fences should be a pervious sheet of synthetic fabric such as polypropylene, nylon, polyester, or polyethylene yarn. Choose the material based on the minimum synthetic fabric requirements shown in Table 1.

Table 1. Minimum requirements for silt fence construction (Sources: USEPA, 1992; VDCR, 1995)

Physical property	Requirements
Filtering efficiency	75%-85% (minimum): highly dependent on local conditions
Tensile strength at 20% (maximum) Elongation	Standard strength: 30 lb/linear inch (minimum) Extra strength: 50 lb/linear inch (minimum)
Ultraviolet radiation	90% (minimum)
Slurry flow rate	0.3 gal/ft^2/min (minimum)

If a standard-strength fabric is used, it can be reinforced with wire mesh behind the filter fabric. This increases the effective life of the fence. The maximum life expectancy for synthetic fabric silt fences is about 6 months, depending on the amount of rainfall and runoff. Burlap fences have a much shorter useful life span, usually up to 2 months.

The stakes used to anchor the filter fabric should be wood or metal. Wooden stakes should be at least 5 feet long and have a minimum diameter of 2 inches if a hardwood like oak is used. Stakes from soft woods like pine should be at least 4 inches in diameter. When using metal posts in place of wooden stakes, they should weigh at least 1.00 to 1.33 lb/linear foot. If metal posts are used, attachment points are needed for fastening the filter fabric with wire ties.

Erect silt fence in a continuous fashion from a single roll of fabric to eliminate gaps in the fence. If a continuous roll of fabric is not available, overlap the fabric from both directions only at stakes or posts. Overlap at least 6 inches. Excavate a trench to bury the bottom of the fabric fence at least 6 inches below the ground surface. This helps to prevent gaps from forming near the ground surface. Gaps would make the fencing useless as a sediment barrier.

The height of the fence posts should be 16 to 34 inches above the original ground surface. If standard-strength fabric is used with wire mesh, space the posts no more than 10 feet apart. If extra-strength fabric is used without wire mesh reinforcement, space the posts no more than 6 feet apart (VDCR, 1995).

The fence should be designed to withstand the runoff from a 10-year peak storm event. Once installed, it should remain in place until all areas upslope have been permanently stabilized by vegetation or other means.

Limitations

Do not install silt fences along areas where rocks or other hard surfaces will prevent you from uniformly anchoring the fence posts and entrenching the filter fabric. Installing fences in such an area greatly reduces their effectiveness and can create runoff channels leading offsite. Silt fences are not suitable for areas where large amounts of concentrated runoff are likely. Open, windy areas present a maintenance challenge, too, because high winds can make the filter fabric deteriorate faster. Do not install silt fences across streams, ditches, or waterways (Smolen et al., 1988).

When the pores of the fence fabric become clogged with sediment, pools of water are likely to form on the uphill side of the fence. Siting and design of the silt fence should account for this. Take care to avoid unnecessarily diverting stormwater from these pools, causing further erosion damage.

Maintenance Considerations

Inspect silt fences regularly and frequently, as well as after each rainfall event, to make sure that they are intact and that there are no gaps where the fence meets the ground or tears along the length of the fence. If you find gaps or tears, repair or replace the fabric immediately. Remove accumulated sediments from the fence base when the sediment reaches one-third to one-half the fence height. Remove sediment more frequently if accumulated sediment is creating noticeable strain on the fabric and the fence might fail from a sudden storm event. When you remove the silt fence, remove the accumulated sediment as well.

Effectiveness

USEPA (1993) reports the following effectiveness ranges for silt fences constructed of filter fabric that are properly installed and well maintained: average total suspended solids removal of 70 percent, sand removal of 80 to 90 percent, silt-loam removal of 50 to 80 percent, and silt-clay-loam removal of 0 to 20 percent. Removal rates are highly dependent on local conditions and installation.

Cost Considerations

Installation costs for silt fences are approximately $6.00 per linear foot (USEPA, 1992). The Southeastern Wisconsin Regional Planning Commission estimates unit costs between $2.30 and $4.50 per linear foot (SWRPC, 1991).

References

NAHB (National Association of Home Builders). 1995. *Guide for Builders and Developers*. National Association of Homebuilders, Washington, DC.

Smolen, M.D., D.W. Miller, L.C. Wyatt, J. Lichthardt, and A.L. Lanier. 1988. *Erosion and Sediment Control Planning and Design Manual*. North Carolina Sedimentation Control Commission; North Carolina Department of Environment, Health, and Natural Resources; and Division of Land Resources Land Quality Section, Raleigh, NC.

SWRPC (Southeastern Wisconsin Regional Planning Commission). 1991. *Costs of Urban Nonpoint Source Water Pollution Control Measures*. Technical report no. 31. Southeastern Wisconsin Regional Planning Commission, Waukesha, WI.

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