

7.3 Sediment Barrier

Description

A sediment barrier is a temporary, porous dam that impounds sediment-laden sheet flow runoff from small areas of disturbed soil. Suspended solids settle out during the brief, shallow ponding of runoff behind the barrier. In some cases, the barrier also filters sediment. Sediment barriers include silt fence, filter socks, and slash mulch berms.

Use Criteria

Use sediment barriers:

- downslope of small areas that sheet flow to the site perimeter,
- where runoff causes sheet or small rill erosion on disturbed areas within the site,
- around temporary soil stockpiles,
- to protect streams, wetlands, and other surface waters.

A sediment barrier is a short-term control that can clog after a runoff event and deteriorate after a few months of exposure. Use upgradient erosion control practices and promptly stabilize the drainage area to minimize the duration the barrier will be needed. Long-term installations may need to be periodically replaced.

Do not place a sediment barrier across a stream, ditch, swale, gully, or concentrated discharge point. Use a sediment settling basin (Chapter 7.1) or sediment trap (Chapter 7.4) to treat concentrated flow.

Multiple rows of sediment barriers do not constitute a higher level of control, nor are they a substitute for other erosion and sediment controls. Multiple rows can be installed as a safeguard when adjacent to sensitive areas such as wetlands. See Chapter 5 for sediment barriers placed in series to interrupt steep slopes.

Refer to Chapter 8.1 for details on residential subdivision lot perimeter controls.

Slash Mulch Berms

Berms constructed of slash mulch generated from on-site clearing and grubbing operations are only appropriate on small, flat drainage areas at least 50 feet from waters of the state and when the barrier will be in service for less than six months.

Design Criteria

A sediment barrier must be capable of temporarily ponding runoff behind it and slowly dispersing it as sheet flow through the full length of the barrier. A sediment barrier that does not intercept the downward flow of site runoff provides no benefit. To be considered functional, a sediment barrier must:

1. be installed on a level contour such that the barrier is generally perpendicular to the flow of surface runoff,
2. be continuous with a minimal number of splices,
3. be sealed to the ground so that flow does not pass under the barrier, and
4. have both ends extended upslope to prevent flow around the barrier (see Figure 7.3.1).

Manufactured sediment barrier products shall be tested by an independent laboratory and documented to achieve a minimum soil retention efficiency of 80 percent under full-scale sheet flow conditions in accordance with *ASTM D735 - Standard Test Method for Determination of Sediment Retention Device Effectiveness in Sheet Flow Applications*.

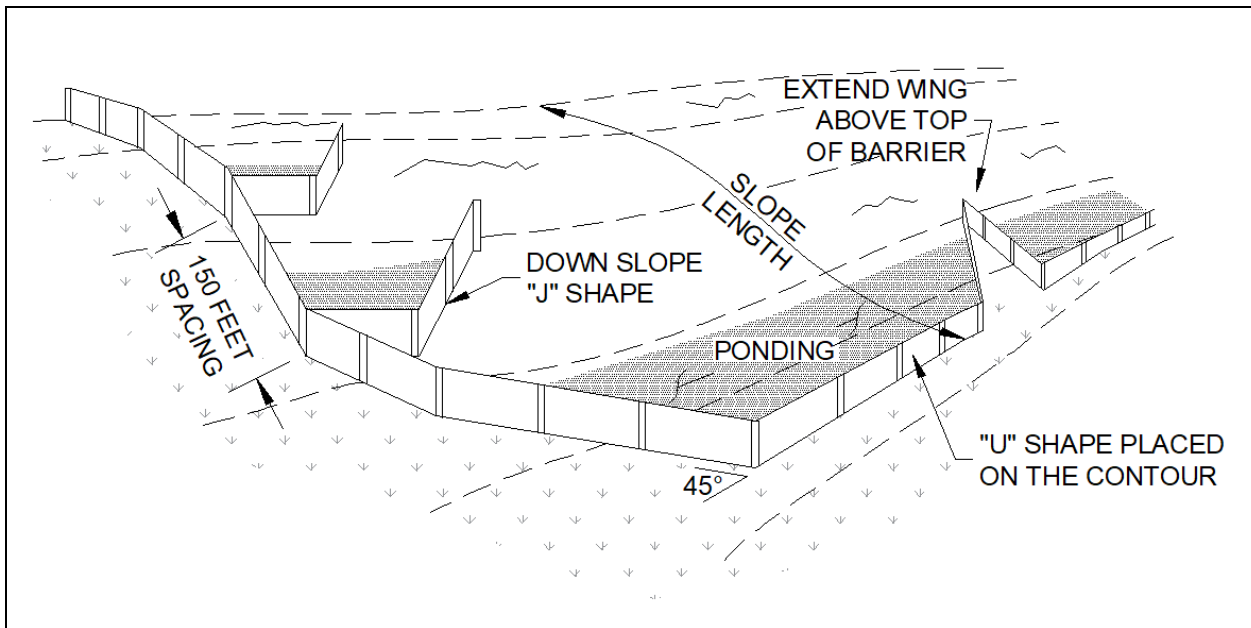


Figure 7.3.1 Illustration of Sediment Barriers Placed on the Contour Using “U” and “J” Shapes

Table 7.3.1 lists the maximum slope length above each type of sediment barrier. The slope length limits reflect the distance sheet flow can be sustained, barrier storage capacity, barrier strength, and barrier flow rates. Divert runoff to a sediment settling basin or trap where the drainage area exceeds the sediment barrier’s capacity.

Land Slope	Silt Fence	Filter Sock by Diameter				Slash Mulch Berm
		8-inch	12-inch	18-inch	24-inch	
<2%	250	125	250	300	350	100
2% to 20%	125	75	125	150	225	n/a
>20%	50	n/a	50	75	100	n/a

Position a sediment barrier with a long, flat slope behind it to provide volume for shallow ponding and sediment storage. Where possible, offset the barrier at least 10 feet beyond the toe of slopes greater than 25 percent and all soil stockpiles as illustrated in Figure 7.3.2. Where practical, create or preserve dense vegetation on the downslope side of a sediment barrier to further trap sediment and distribute flow.

Position perimeter sediment barriers according to site topography and drainage patterns. Avoid installing barriers directly along sloping property lines, as this can reroute erosive runoff instead of ponding it.

Extend the ends of the barrier upslope at a 45-degree angle from the primary alignment to form the “U” or “J” as illustrated in Figure 7.3.1. Where feasible, ensure the bottom of the terminal ends are higher in elevation than the top of the portion along the contour. Break long barrier runs into U-shaped segments with a maximum length of 300 feet to better pond runoff, disperse flow, and limit the impacts should the barrier fail.

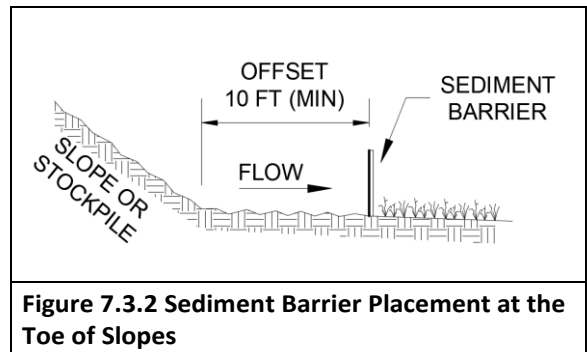


Figure 7.3.2 Sediment Barrier Placement at the Toe of Slopes

Protect and/or improve the visibility of sediment barriers installed in areas of heavy traffic or construction activity.

Manufactured Filter Socks

Filter socks are a natural or synthetic, continuously knitted or woven fabric tube that is filled with composted wood chips or equivalent bulk organic solids. The fill material must meet the particle size distribution specified in Table 7.3.2 and be free of visible contaminants, weed seeds, and pests. The fill density must be sufficient to maintain 80 percent of the tube height under normal loads. Biodegradable fabrics are encouraged when feasible.

Filter sock installation must match the manufacturer's specifications, including anchorage methods and embedment/trenching requirements.

Slash Mulch Berms

Construct slash mulch berms with only well-graded shredded wood generated from on-site clearing and grubbing operations. No construction debris or other material may be used. The maximum particle size is two inches by 20 inches. Place the slash mulch in approximately six-inch-thick lifts and lightly compact each layer with rubber-tire or tracked equipment.

Stormwater Pollution Prevention Plan

Include plans and specifications in a stormwater pollution prevention plan (SWP3) that describe the requirements for applying the practice to achieve its intended purpose. As a minimum, include the following in the SWP3.

- Indicate the location of all planned sediment barriers.
- Indicate the drainage area that the sediment barrier is capturing.
- Include detailed drawings and specifications for the practice.
- Indicate the required filter sock diameter, where applicable.
- Convey that a sediment barrier be installed prior to disturbing the area and maintained until final stabilization.

Inspection and Maintenance

See the practice specifications that follow.

References

- AASHTO. 2017. Standard Practice for Erosion/Sediment Control (Filter Berms and Filter Socks). AASHTO Designation R 51-13, Release Group 3.
- ASTM. 2019. D6462-19. Standard Practice for Silt Fence Installation. West Conshohocken, PA
- District of Columbia. 2019. Erosion and Sediment Control Field Handbook. Department of Energy and Environment.
- Erosion Control Technology Council. 2020. Standard Specification for Sediment Retention Fiber Roles (SRFRS), Version March 30, 2020.
- International Erosion Control Association. 2020. Sediment Barrier - Silt Fence State-of-the-Practice.
- Iowa. 2025. Statewide Urban Design and Specifications. Design Manual, Chapter 1 General Provisions, 7E-4 Filter Socks. Iowa State University. Ames, IA
- Iowa. 2025. Statewide Urban Design and Specifications. Design Manual, Chapter 1 General Provisions, 7E-14 Silt Fences. Iowa State University. Ames, IA
- Iowa. 2024. Statewide Urban Design and Specifications. Design Manual, Chapter 1 General Provisions, 7E-3 Filter Berms. Iowa State University. Ames, IA
- North Central Texas Council of Governments. 2020. iSWM Technical Manual.

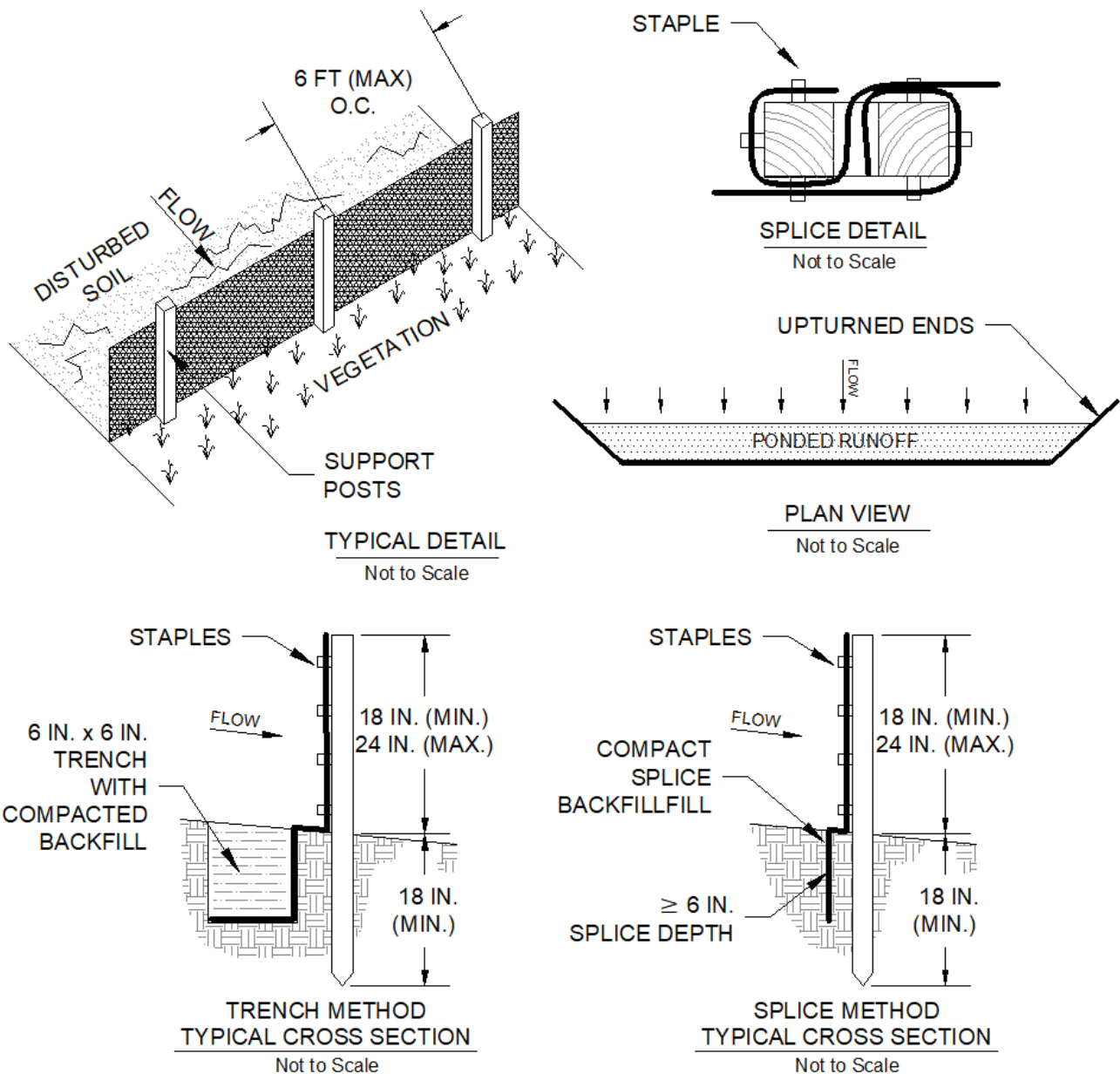
Perez, M., Whitman, J., Donald, W., and B. Roche. 2024. Evaluation of NDOT's Sediment Barrier Practices Using Performance Data Final Report. Sponsored by the Nebraska Department of Transportation.

Wilson, B. 2019. Sediment Control Log Performance, Design, and Decision Matrix for Field Applications. Minnesota DOT Research Project Final Report 2019-23. University of Minnesota.

Whitman, J., Zech, W., and W. Donald. 2019. Full-Scale Performance Evaluations of Innovative and Manufactured Sediment Barrier Practices. In Transportation Research Record Vol. 2673(8) 284–297.

Wisconsin. 2024. Technical Standard Perimeter Sediment Control and Slope Interruption. 1056. Department of Natural Resources.

Practice Specification Silt Fence



Scope

Furnish all materials, labor, and equipment necessary for constructing silt fence in accordance with the construction drawings and these specifications. Silt fence shall be installed and operational before upslope land disturbance begins.

Materials

1. Support posts shall be 2-inch by 2-inch wood posts of sound quality or equivalent.
2. Geotextile fabric shall meet the minimum criteria listed in Table 7.3.2.

Table 7.3.2 Silt Fence Geotextile Filter Fabric Material Specifications. (ASTM D6461/6461M)

Permittivity	$\geq 0.05 \text{ s}^{-1}$	ASTM D4491
Apparent Opening Size	$\leq 0.6 \text{ mm}$ (30 Sieve)	ASTM D4751
Minimum Grab Tensile Strength	90 lb.	ASTM D4632
Minimum Tear Strength	60 lb.	ASTM D 4533
Minimum Puncture Strength	325 lb.	ASTM D6241
UV Stability	70% after 500 hours	ASTM D4355

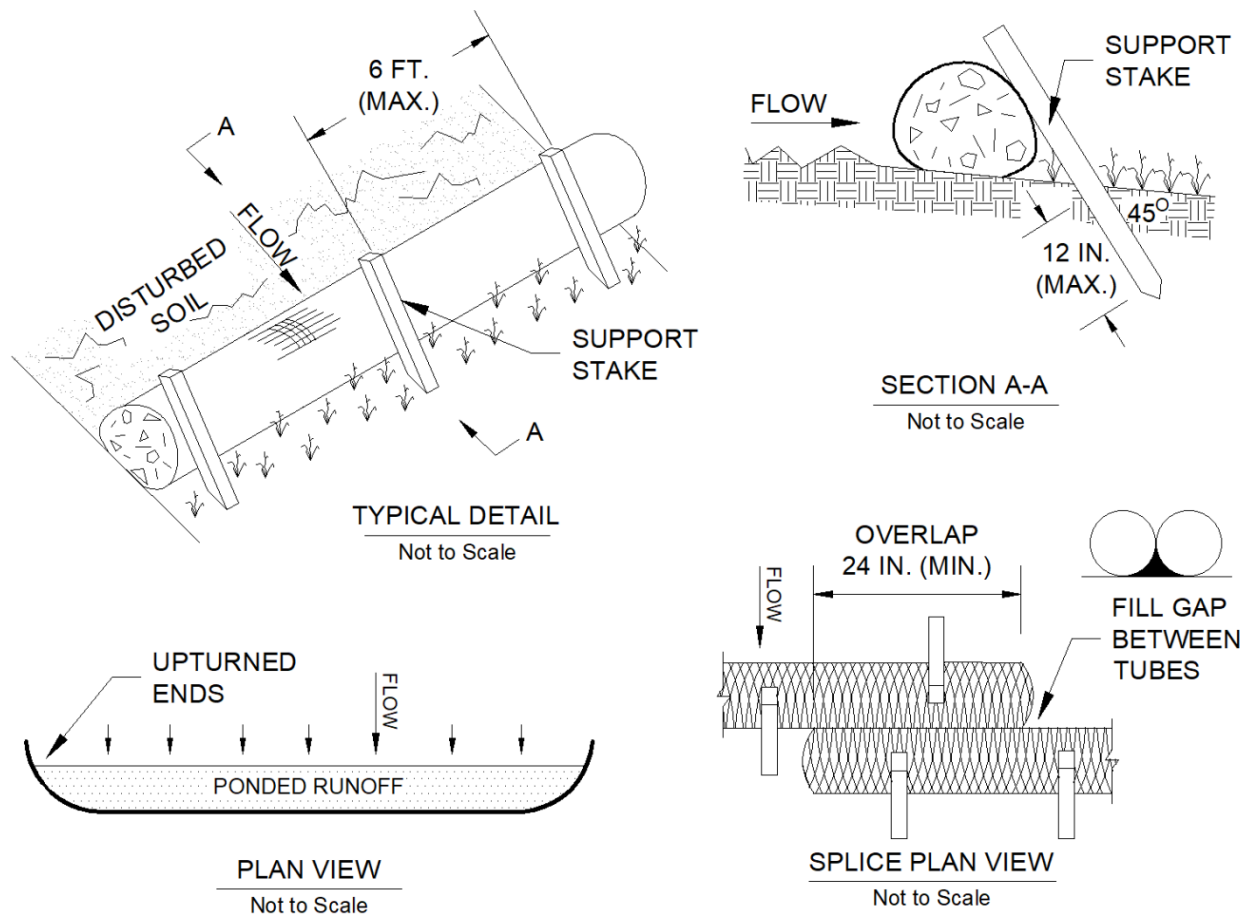
Installation

- The above-ground height of the silt fence should be 18 inches, but no more than 24 inches. A higher silt fence may not withstand the weight of water and sediment behind it and is not recommended.
- Support posts shall be placed on the downslope side of the geotextile at a maximum spacing of 6 feet (10 feet for wire-supported silt fence) and driven a minimum of 18 inches into the soil or adequately secured to prevent overturning of the silt fence where bedrock or buried utilities prevent an 18-inch ground penetration.
- Fasten the geotextile to the upslope side of posts with a minimum of four staples per post, such that it remains secure and taut but does not rip.
- The bottom 8 to 12 inches of geotextile shall be buried in a “J” configuration in a trench a minimum of 6 inches wide and 6 inches deep or sliced 8 to 12 inches deep. A minimum of 8 inches of geotextile must be below the ground surface. Compact soil on both sides of the fabric. Offsetting the trench 6 inches upstream from the silt fence is recommended to improve the stability of the support stakes.
- Install silt fence in continuous segments with upturned ends. Where necessary, splices shall be made by overlapping geotextile materials around support posts to provide a secure and seamless joint.

Maintenance and Removal

- Inspect silt fence after each 0.50-inch or greater rain event and at least daily during multi-day rain events. Inspections during rain events will aid in evaluating performance. If bypass occurs during 0.50 inches of rain or less, change the layout or replace the silt fence with a sediment trap as necessary.
- Silt fence that does not dewater in 48 hours or less is clogged and needs to be replaced.
- Remove sediment when the deposit reaches approximately one-half of the height of the silt fence. If sediment accumulates beyond this level, the fabric will likely be clogged and need to be replaced.
- Repair damaged silt fence upon discovery.

Practice Specification Manufactured Filter Sock



Scope

Furnish all materials, labor, and equipment necessary for installing filter sock in accordance with the construction drawings and these specifications. Filter socks shall be installed and operational before upslope land disturbance begins. Follow the manufacturer's specifications on use, installation, and maintenance.

Materials

1. Manufactured filter sock products shall be tested by an independent laboratory and documented to achieve a minimum soil retention efficiency of 80 percent under full-scale sheet flow conditions in accordance with ASTM D7351, Standard Test Method for Determination of Sediment Retention Device Effectiveness in Sheet Flow Applications.
2. Tubing shall be a natural or synthetic, continuously knitted, or woven fabric.
3. Fill shall be compost, wood chips, or equivalent bulk organic solids that are free of visible contaminants, weed seeds, and pests. Fill material shall meet the particle size distribution shown in Table 7.3.2.
4. The fill density must be sufficient to maintain 80 percent of the tube height under normal loads.

Sieve Size	Percent Passing
2 inches	100%
1 inch	90-100%
3/8 inch	0-50%

- Support stakes shall be sound-quality wood stakes with nominal dimensions of at least 0.75 inches by 0.75 inches or equivalent.

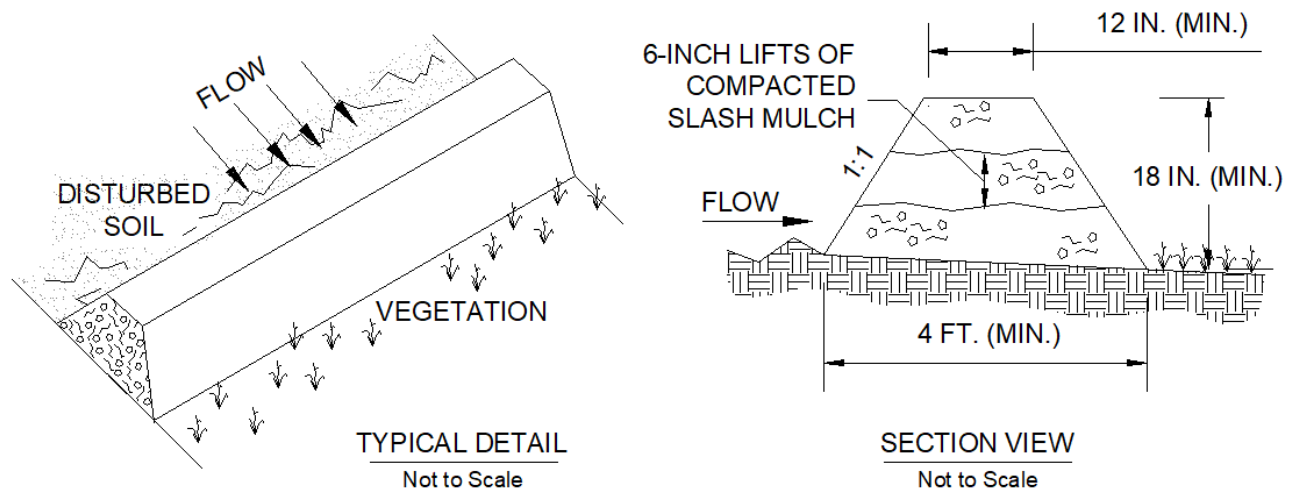
Installation

- Prepare the ground surface to ensure good ground contact over the full length of the filter sock. Remove clumps of soil, rocks, or debris that may tent the sock. Repair any rills or gullies that the sock may bridge over. In areas of uneven terrain, it may be necessary to place the sock in a shallow trench.
- Install filter socks in continuous segments with upturned ends. The number of splices in a segment shall be minimal.
- Install filter socks according to the manufacturer's specifications and the tested configuration. Where not specified, stake the barrier at a 45-degree angle on the downstream side such that the tube is wedged to the ground as shown in this drawing. Install stakes at the end of each barrier and no more than 6-foot centers along the entire length of the barrier. Use alternative anchoring, such as sandbags, if rocky soil prevents staking.

Maintenance and Removal

- Do not drive over filter socks.
- Inspect sediment barriers after each 0.50-inch or greater rain event and at least daily during multi-day rain events. Inspections during rain events will aid in evaluating performance. If bypass occurs during 0.50 inches of rain or less, change the layout or replace the barrier with a sediment trap as necessary.
- Filter socks that do not dewater in 24 hours or less are clogged and need to be replaced.
- Remove sediment when the deposit reaches approximately one-half of the height of the sediment barrier.
- Repair damaged sediment barriers upon discovery.

Practice Specification Slash Mulch Berm



Scope

Furnish all materials, labor, and equipment necessary for constructing a slash mulch berm in accordance with the construction drawings and these specifications. Slash mulch berms shall be installed and operational before upslope land disturbance begins.

Materials

1. Slash mulch shall be well-graded shredded wood with a maximum particle size of 2 inches by 20 inches that is free of visible contaminants.

Installation

1. Construct the berm from bottom up in approximately 6-inch-thick lifts. Lightly compact each lift with rubber-tire or tracked equipment.

Maintenance and Removal

1. Inspect sediment barriers after each 0.50-inch or greater rain event and at least daily during multi-day rain events. Inspections during rain events will aid in evaluating performance. If bypass occurs during 0.50 inches of rain or less, change the layout or replace the barrier with a sediment trap as necessary.
2. Sediment barriers that do not dewater in 24 hours or less are clogged and need to be replaced.
3. Remove sediment when the deposit reaches approximately one-half of the height of the sediment barrier. If sediment accumulates to this level, the barrier will likely be clogged and need to be replaced.
4. Repair damaged sediment barriers upon discovery. If the berm continues to be bypassed or is breached, it must be expanded, enlarged, or replaced with another type of sediment barrier. Add additional mulch material as required to maintain the dimensions of the berm.
5. Remove the material and re-stabilize the area when the berm is no longer needed.