

## Sediment Barrier (SB)

SILT FENCE   
 STRAW BALE BARRIER 



### Practice Description

Silt fencing is a temporary sediment barrier used across a landscape to reduce the quantity of sediment that is moving farther downslope. Commonly used barriers include silt fence (a geotextile fabric that is trenched into the ground and attached to supporting posts) or hay bales trenched into the ground. Other barrier materials include sand bags, brush piles, and various man-made materials and devices that can be used in a similar manner as silt fence and hay bales.

This practice applies where sheet and rill erosion occurs on small disturbed areas. Barriers intercept runoff from upslope to form ponds that temporarily store runoff and allow sediment to settle out of the water and stay on the construction site.

### Planning Considerations

Sediment barriers may be used on developing sites. They should be installed on the contour so that flow will not concentrate and cause bypassing by runoff going around the end of the barrier or overtopping because of lack of storage capacity.

The most commonly used sediment barriers are silt fences, manufactured sediment logs (several names other than “logs” are used), and hay bales. Silt fences and manufactured sediment logs are preferable to hay bales because they are more likely to be installed correctly. The design and installation of a hay bale sediment barrier is the same as for *Straw Bale Sediment Traps*. Manufactured sediment logs should be installed according to manufacturer’s recommendations.

The silt fence is the only sediment barrier covered in this manual.

The success of silt fences depends on a proper installation that causes the fence to develop maximum efficiency of sediment trapping. Silt fences should be carefully installed to meet the intended purpose.

A silt fence is specifically designed to retain sediment transported by sheet flow from disturbed areas, while allowing water to pass through the fence. Silt fences should be installed to be stable under the flows expected from the site. Silt fences should not be installed across streams, ditches, waterways, or other concentrated flow areas.

Silt fences are composed of woven geotextile supported between steel or wooden posts. Silt fences are commercially available with geotextile attached to the post, and can be rolled out and installed by driving the post into the ground. This type of silt fence is simple to install, but more expensive than some other installations. Silt fences must be trenched in at the bottom to prevent runoff from undermining the fence and developing rills under the fence. Locations with high runoff flows or velocities should use wire reinforcement.

## **Design Criteria**

Silt fence installations are normally limited to situations in which only sheet- or overland-flow is expected because they normally cannot pass the volumes of water generated by channel flows. Silt fences are normally constructed of synthetic fabric (woven geotextile), and the life is expected to be the duration of most construction projects. Silt fence fabric should conform to the requirements of Table SB-1.

The drainage area behind the silt fence should not exceed  $\frac{1}{4}$  acre per 100 linear feet of silt fence for non-reinforced fence and  $\frac{1}{2}$  acre per 100 linear feet of wire-reinforced fence. When all runoff from the drainage area is to be stored behind the fence (i.e. no stormwater disposal system is in place), the maximum slope length behind the fence should not exceed the value shown in Table SB-2.

## **Type A Silt Fence**

The Type A fence is 36" wide with wire reinforcement and is used on sites needing the highest degree of protection by a silt fence. The wire reinforcement is necessary because the Type A silt fence is used for the highest flow situations and has almost 3 times the flow rate as the Type B silt fence. Type A silt fence should be used where runoff flows or velocities are particularly high or where slopes exceed a vertical height of 10 feet.

Provide a riprap splash pad or other outlet protection device for any point where flow may overtop the sediment fence. Ensure that the maximum height of the fence at a protected, reinforced outlet does not exceed 1 foot and that support post spacing does not exceed 4 feet.

This silt fence should be installed as shown in Figure SB-1. Materials for posts and fasteners are shown in Tables SB-3 and SB-4. Details for overlap of the silt fence and fastener placement are shown in Figure SB-4.

Table SB-1 Specifications for Silt Fence

Specifications	Type A	Type B	Type C
<b>Tensile Strength (Lbs. Min.)<sup>1</sup> (ASTM D-4632)</b>	Warp – 260 Fill – 100	Warp – 120 Fill – 100	Warp – 120 Fill – 100
<b>Elongation (% Max.) (ASTM D-4632)</b>	40	40	40
<b>AOS (Apparent Opening Size) (Max. Sieve Size) (ASTM D-4751)</b>	No. 30	No. 30	No. 30
<b>Flow Rate (Gal/Min/Sq. Ft.) (GDT-87)</b>	70	25	25
<b>Ultraviolet Stability<sup>2</sup> (ASTM D-4632 after 300 hours weathering in accordance with ASTM D-4355)</b>	80	80	80
<b>Bursting Strength (PSI Min.) (ASTM D-3786 Diaphragm Bursting Strength Tester)</b>	175	175	175
<b>Minimum Fabric Width (Inches)</b>	36	36	22

<sup>1</sup> Minimum roll average of five specimens.<sup>2</sup> Percent of required initial minimum tensile strength.

Table SB-2 Slope Limitations for Silt Fence

Land Slope (Percent)	Maximum Slope Length Above Fence (Feet)
<2	100
2 to 5	75
5 to 10	50
10 to 20*	25
>20	15

\*In areas where the slope is greater than 10%, a flat area length of 10 feet between the toe of the slope to the fence should be provided.

### Type B Silt Fence

This 36" wide filter fabric should be used on developments where the life of the project is greater than or equal to 6 months.

This silt fence should be installed as shown in Figure SB-2. Materials for posts and fasteners are shown in Tables SB-3 and SB-4. Details for overlap of the silt fence and fastener placement are shown in Figure SB-4.

### Type C Silt Fence

Though only 22" wide, this filter fabric allows the same flow rate as Type B silt fence. Type C silt fence should be limited to use on relatively minor projects, such as residential

home sites or small commercial developments where permanent stabilization will be achieved in less than 6 months.

This silt fence should be installed as shown in Figure SB-3. Materials for posts and fasteners are shown in Tables SB-3 and SB-4. Details for overlap of the silt fence and fastener placement are shown in Figure SB-4.

Table SB-3 Post Size for Silt Fence

	Minimum Length	Type of Post	Size of Post
<b>Type A</b>	4'	Steel	1.3 lb./ft. min.
<b>Type B</b>	4'	Soft Wood	3" diameter or 2 X 4
		Oak	1.5" X 1.5"
<b>Type C</b>	3'	Steel	1.3 lb./ft. min.
		Soft Wood	2" diameter or 2 X 2
		Oak	1" X 1"
		Steel	0.75 lb./ft. min.

Table SB-4 Wood Post Fasteners for Silt Fence

	Gauge	Crown	Legs	Staples/Post
<b>Wire Staples</b>	17 min.	¾" wide	½" long	5 min.
	Gauge	Length	Button Heads	Nail/Post
<b>Nails</b>	14 min.	1"	¾" long	4 min.

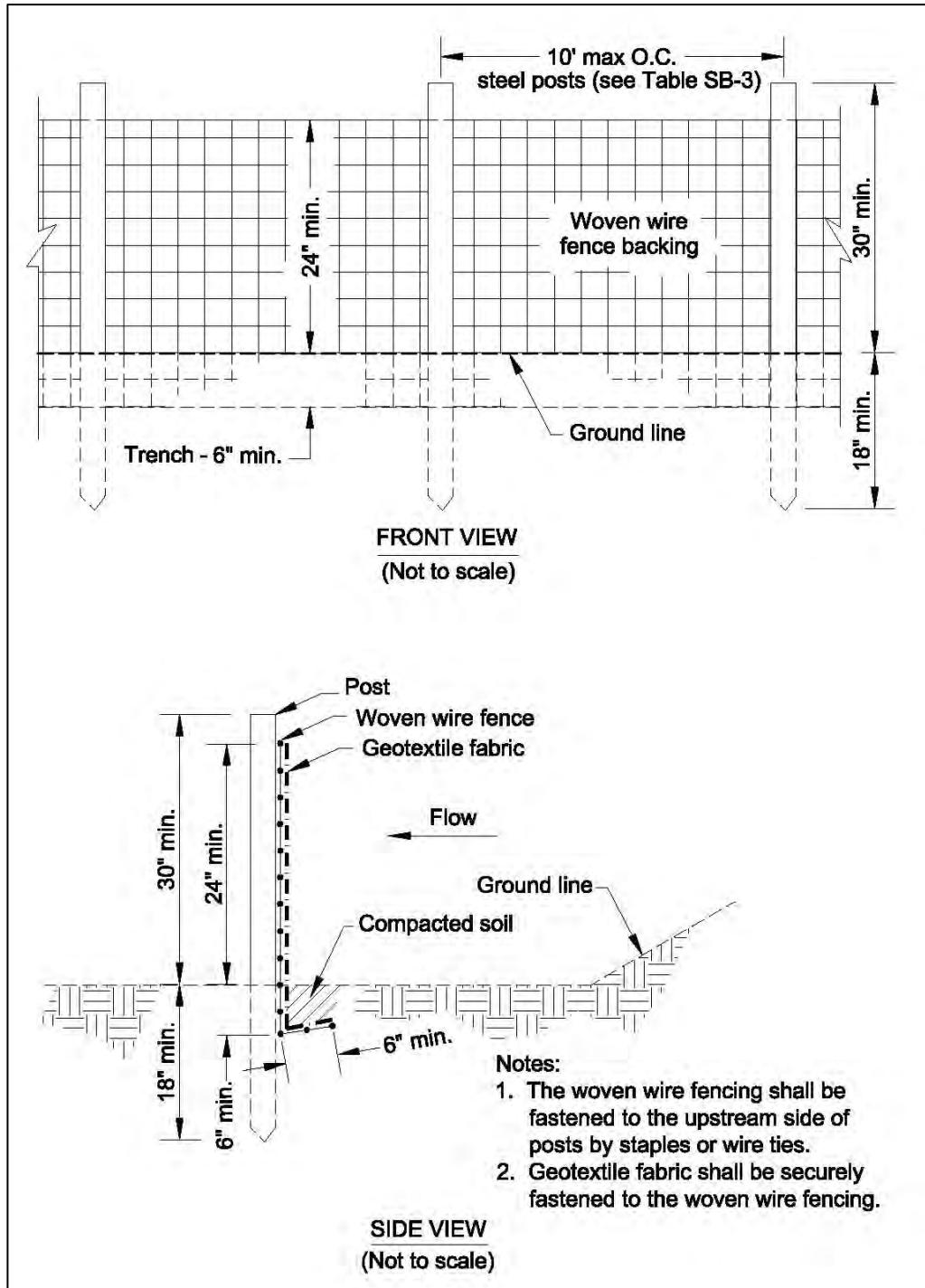


Figure SB-1 Silt Fence-Type A

- (1) For fabric material requirements see Table SB-1
- (2) For post material requirements see Tables SB-3 and SB-4

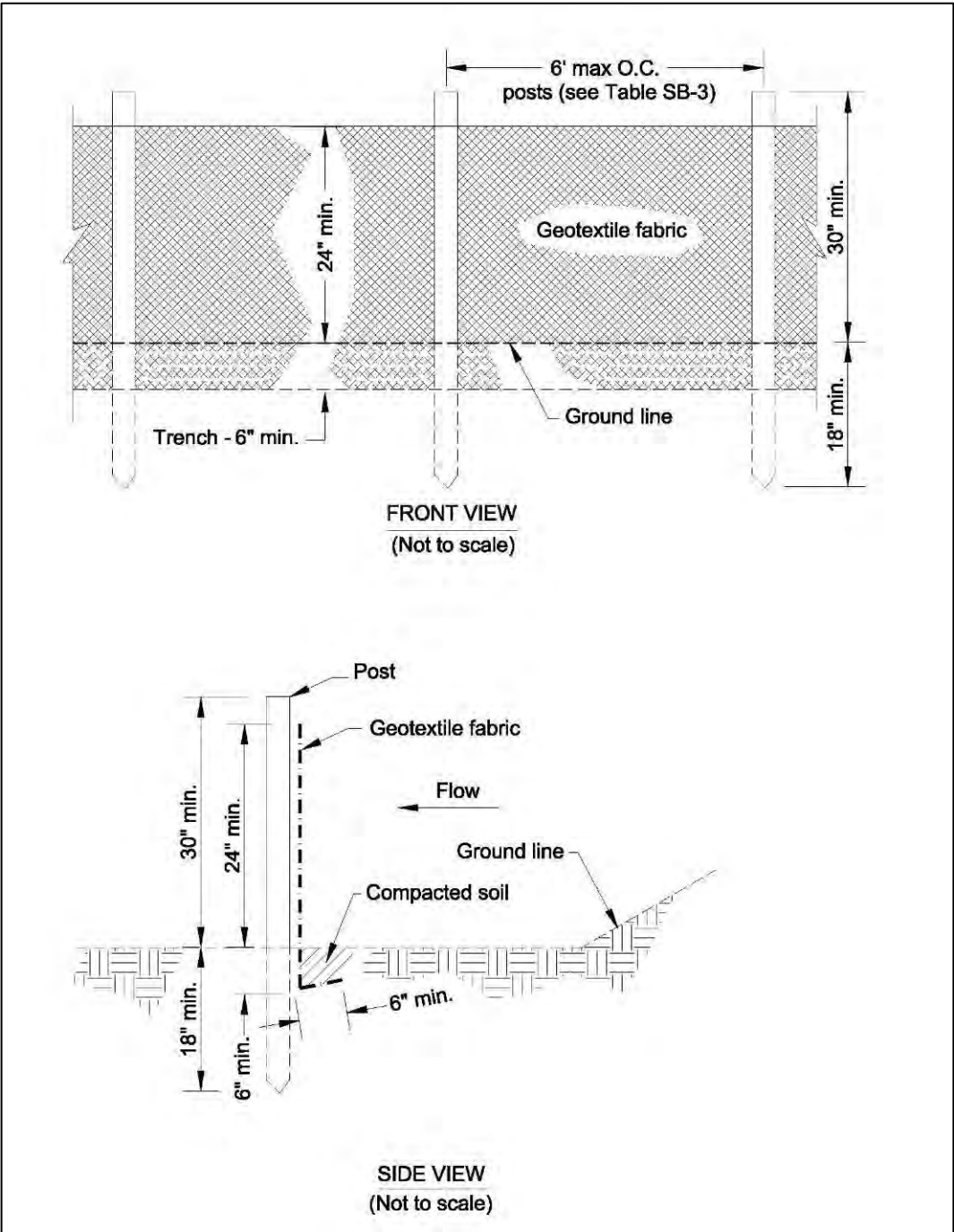


Figure SB-2 Silt Fence - Type B

- (1) For fabric material requirements see Table SB-1
- (2) For post material requirements see Tables SB-3 and SB-4

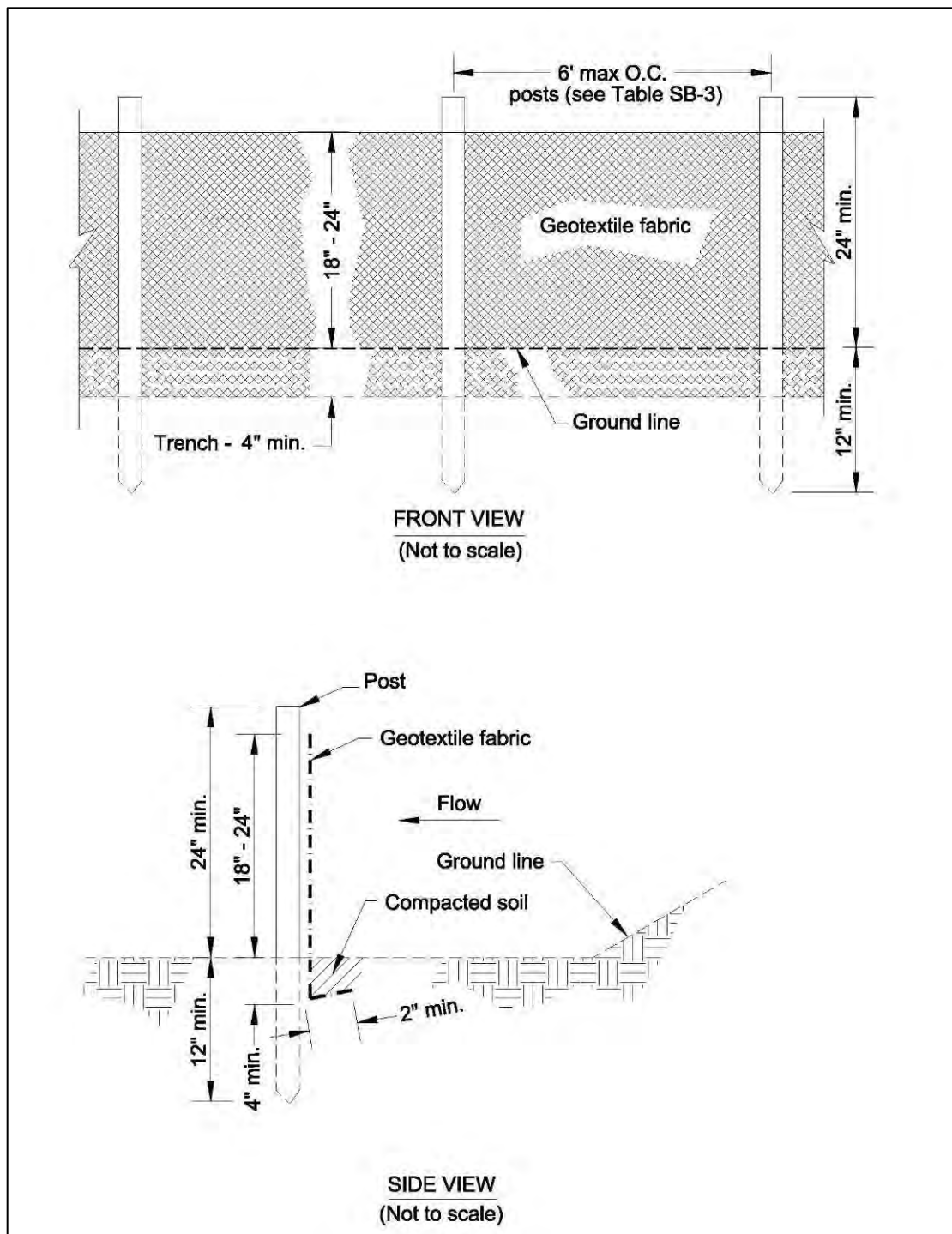


Figure SB-3 Silt Fence – Type C

- (1) For fabric material requirements see Table SB-1
- (2) For post material requirements see Tables SB-3 and SB-4

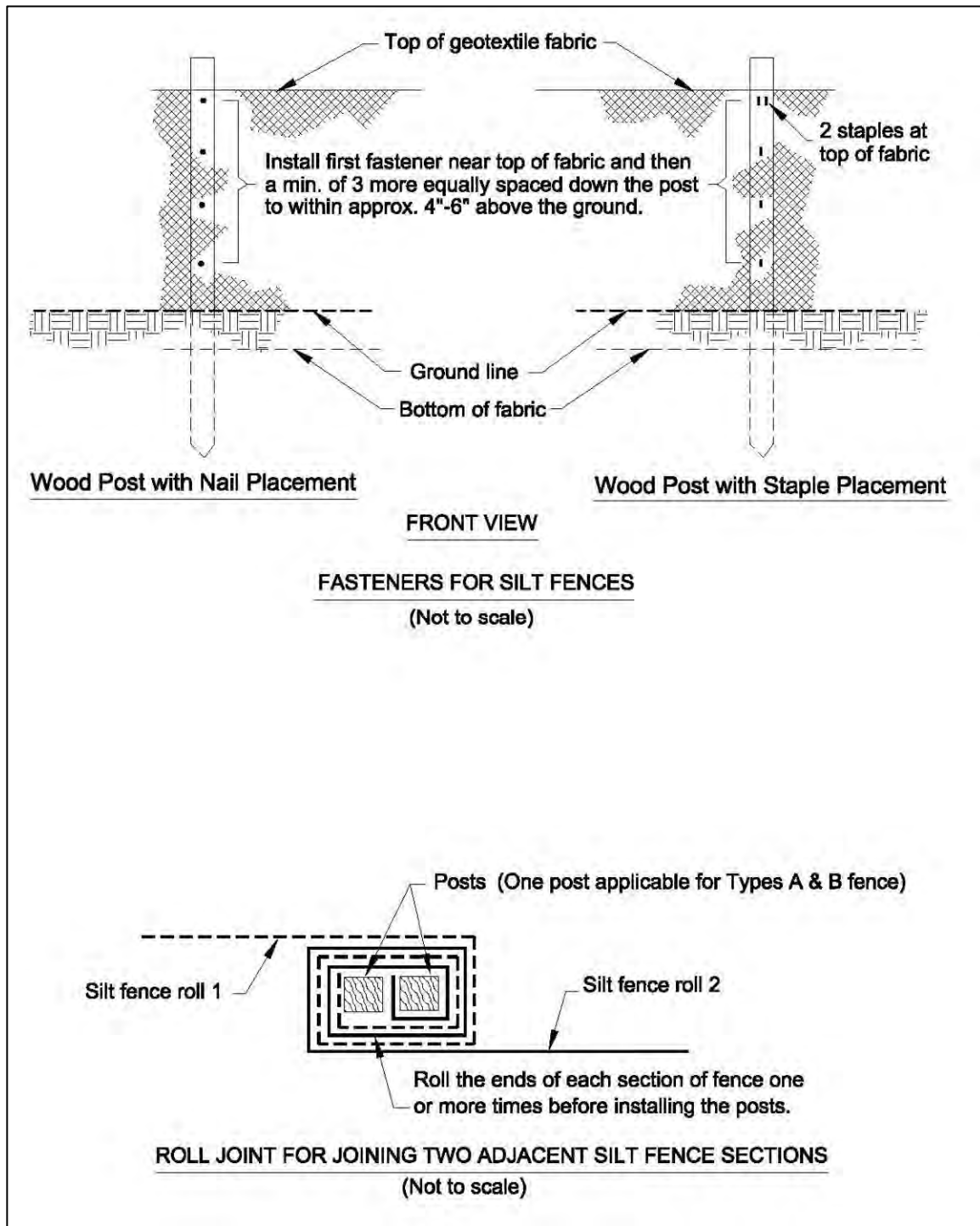


Figure SB-4 Silt Fence Installation Details



## Construction

Prior to start of construction, sediment barriers should be designed by a qualified professional. Plans and specifications should be referred to by field personnel throughout the construction process.

*Note: Silt fence is the only barrier installation being covered in this handbook.*

## Site Preparation

Determine exact location of underground utilities so that locations for digging or placement of stakes can be selected where utilities will not be damaged.

Smooth the construction zone to provide a broad, nearly level area for the fence. The area should be wide enough throughout the length of the fence to provide storage of runoff and sediment behind the fence.

## Silt Fence Installation

Silt fence should be installed on the contour, so that runoff can be intercepted as sheet flow; ends should be flared uphill to provide temporary storage of water. Silt fence should be placed so that runoff from disturbed areas must pass through the fence. Silt fence should not be placed across concentrated flow areas such as channels or waterways. When placed near the toe of a slope, the fence should be installed far enough from the slope toe to provide a broad, flat area for adequate storage capacity for sediment. Dig a trench at least 6" deep along the fence alignment as shown in Figures SB-1 and SB-2 for Types A & B fences. Type C fences require only a 4" deep trench as shown in Figure SB-3. **Please note that installation with a silt fence installation machine may permit different depths if performance is equal.**

Drive posts at least 18" into the ground on the downslope side of the trench. Space posts a maximum of 10 feet if fence is supported by woven wire, or 6 feet if high-strength fabric and no support fence is used.

Fasten support wire fence to upslope side of posts, extending 6" into the trench, as shown in the appropriate figure for the type fence (see Figure SB-1, SB-2 or SB-3).

Attach a continuous length of fabric to the upslope side of fence posts. Minimize the number of joints and, when necessary to join rolls, they should be joined by rolling the ends together using the "roll joint" method illustrated in Figure SB-4. Avoid joints at low points in the fence line.



For Types A and B silt fence, place the bottom 12" of fabric in the 6" deep (minimum) trench, lapping toward the upslope side. For Type C fabric, place the bottom 6" in the 4" deep (minimum) trench lapping toward the upslope side.

Backfill the trench with compacted earth or gravel as shown in Figures SB-1 – SB-3.

Provide good access in areas of heavy sedimentation for cleanout and maintenance.

### **Erosion Control**

Stabilize disturbed areas in accordance with the vegetation plan. If no vegetation plan exists, consider planting and mulching as a part of barrier installation, and select planting information from the appropriate planting practice (*Permanent Seeding* or *Temporary Seeding*). Select mulching information from the *Mulching Practice*.

### **Construction Verification**

Check finished grades and dimensions of the sediment fence. Check materials for compliance with specifications.

### **Common Problems**

*Consult with a qualified design professional if any of the following occurs:*

Variations in topography on site indicate sediment fence will not function as intended, or alignment is not on contour, or fence crosses concentrated flow areas; changes in plan may be needed.

Design specifications for filter fabric, support posts, support fence, gravel, or riprap cannot be met; substitutions may be required. Unapproved substitutions could lead to failure.

Drainage area appears to exceed ¼ acre for 100 feet of non-reinforced silt fence and ½ acre for 100 feet for reinforced fence. Additional sediment-control BMPs may be required.

### **Maintenance**

Inspect sediment fences at least once a week and after each significant rain event.

Make required repairs immediately.

Should the fabric of silt fence collapse, tear, decompose, or become ineffective, replace it promptly.

Remove sediment deposits when they reach a depth of 15" or ½ the height of the fence as installed, to provide adequate storage volume for the next rain event and to reduce pressure on the fence.

After the contributing drainage area has been properly stabilized, remove all barrier materials and unstable sediment deposits, bring the area to grade, and stabilize it with vegetation.

## References

### **BMPs from Volume I**

#### **Chapter 4**

Mulching (MU) 4-48

### **MDOT Drawing ECD-2**

Details of Sediment Barrier Applications 4-295

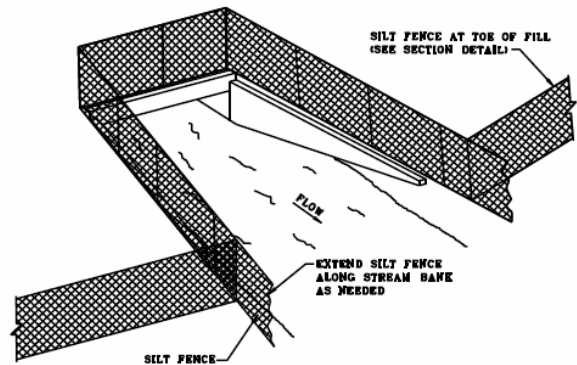
### **MDOT Drawing ECD-3**

Details of Silt Fence Installation 4-296

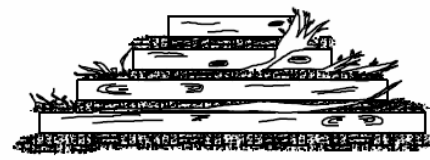
### **MDOT Drawing SSF-1**

Super Silt Fence 4-297

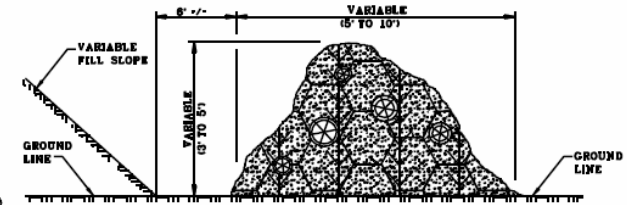
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**SEDIMENT BARRIER AT CROSS DRAIN**



**FRONT ELEVATION**



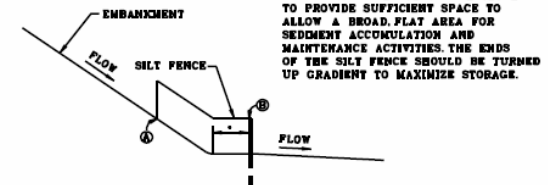
**SIDE ELEVATION**

**TEMPORARY BRUSH BARRIER**

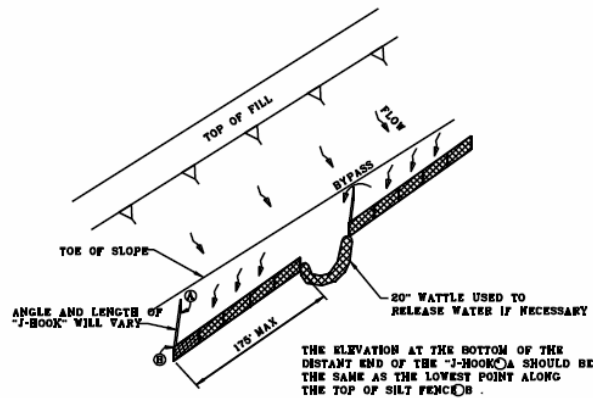
**NOTES:**

1. BRUSH BARRIER MAY BE USED WHERE NATURAL GROUND IS LEVEL OR SLOPING AWAY FROM PROJECT.
2. PLACE BRUSH LOG AND TREE LAPS APPROXIMATELY PARALLEL TO TOE OF FILL SLOPE WITH SOME OF THE HEAVIER MATERIALS BEING PLACED ON TOP TO PROPERLY SECURE THE BARRIER AS DETAILED AT LOCATIONS SHOWN ON PLANS OR AS DIRECTED OR PERMITTED BY THE ENGINEER.
3. TO ALLOW WATER TO SEEP THROUGH BRUSH BARRIER, INTERMINGLE THE BRUSH LOG AND TREE LAPS SO AS NOT TO FORM A SOLID DAM.
4. THE BRUSH BARRIER MAY BE CHOKED WITH FILTER FABRIC.
5. TEMPORARY BRUSH BARRIER WILL NOT BE MEASURED FOR SEPARATE PAYMENT.

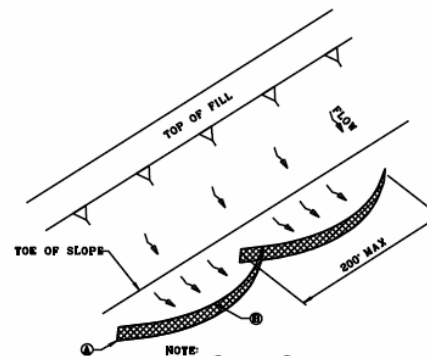
**NOTE:**  
1. ANCHOR AND INSTALL SILT FENCE PER DETAILS SHOWN ON ECD-3



**SILT FENCE SECTION AT TOE OF FILL**



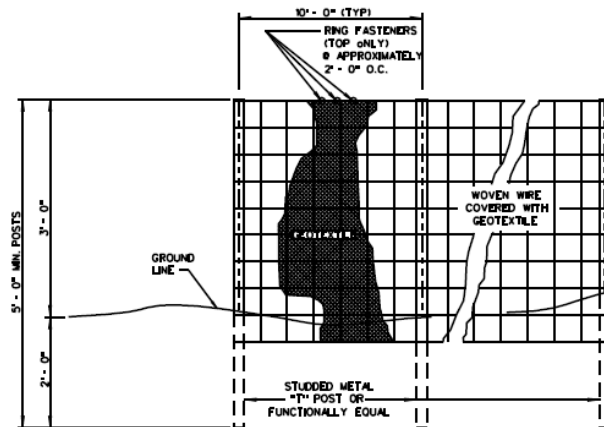
**"J-HOOK" SILT FENCE APPLICATION**



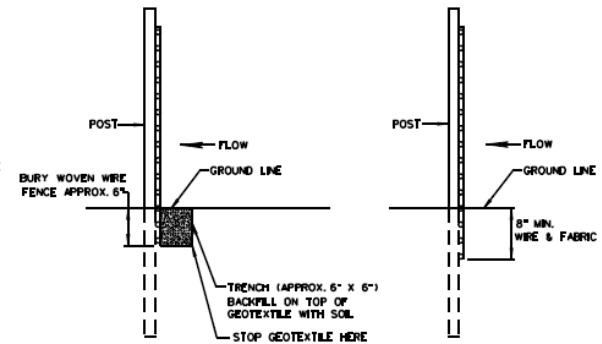
**"SMILE-CONFIGURATION" SILT FENCE APPLICATION**

MISSISSIPPI DEPARTMENT OF TRANSPORTATION			
DETAILS OF SEDIMENT BARRIER APPLICATIONS			
DESIGN	BY	DATE	WORKING NUMBER
FILENAME: EROSION CONTROL\ECD-2.DGN			ECD-2
DESIGN TEAM	CHECKED	DATE	SHEET NUMBER

STATE	PROJECT NO.
MISS.	



ELEVATION VIEW



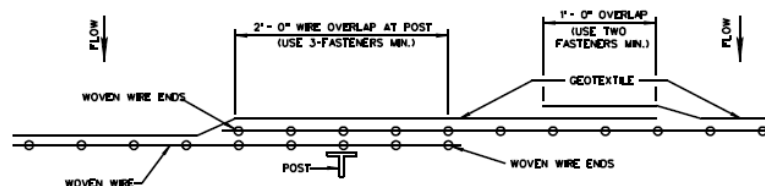
METHOD I

METHOD II  
MECHANICAL INSTALLATION

SIDE VIEW

## NOTES:

1. SILT FENCES SHALL BE USED IN AREAS WHERE FLOW IS NOT SEVERE.
2. SILT FENCES ARE TEMPORARY SEDIMENT CONTROL ITEMS THAT SHALL BE ERECTED OPPOSITE DROBBLE AREAS SUCH AS NEWLY GRADED FILL SLOPES AND ADJACENT TO STREAMS AND CHANNELS.
3. SILT FENCE SHOULD BE PLACED WELL INSIDE RIGHT-OF-WAY AND ALONG EDGE OF CLEARING LIMITS. THIS WILL ALLOW ROOM FOR A BACK-UP FENCE IF FIRST FENCE BECOMES FULL.
4. WHEREVER POSSIBLE SILT FENCE SHALL BE CONSTRUCTED ACROSS A LEVEL AREA IN THE SHAPE OF A SMILE. THIS AIDS IN PONDING OF RUNOFF AND FACILITATES SEDIMENTATION.
5. THE CONTRACTOR MAY ELECT TO USE EITHER METHOD I OR METHOD II. COST TO BE LINEAR FEET OF SILT FENCE.
6. METHOD I INSTALLATION SHALL BE ACCOMPLISHED USING AN IMPLEMENT THAT IS MANUFACTURED FOR THE APPLICATION AND PROVIDES A CONFIGURATION MEETING THE REQUIREMENTS OF THE DETAIL.
7. WIRE SHALL BE MINIMUM OF 32" IN WIDTH AND SHALL HAVE A MINIMUM OF 6 LINE WIRES WITH 12" STAY SPACING.
8. GEOTEXTILE FABRIC MEETING THE TYPE I MATERIAL REQUIREMENTS AND INSTALLED ACCORDING TO SPECIFICATION MAY BE USED WITHOUT WIRE FENCE.

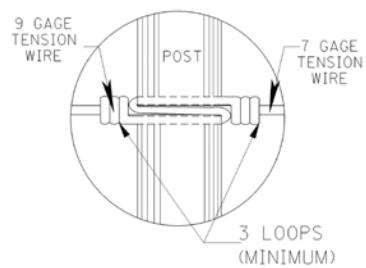
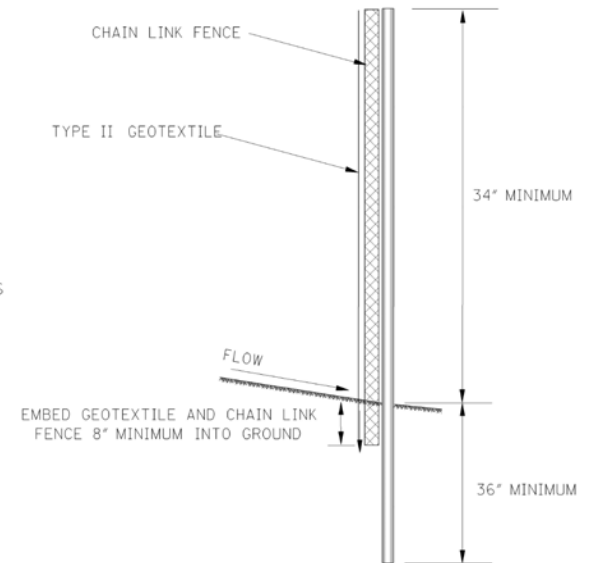
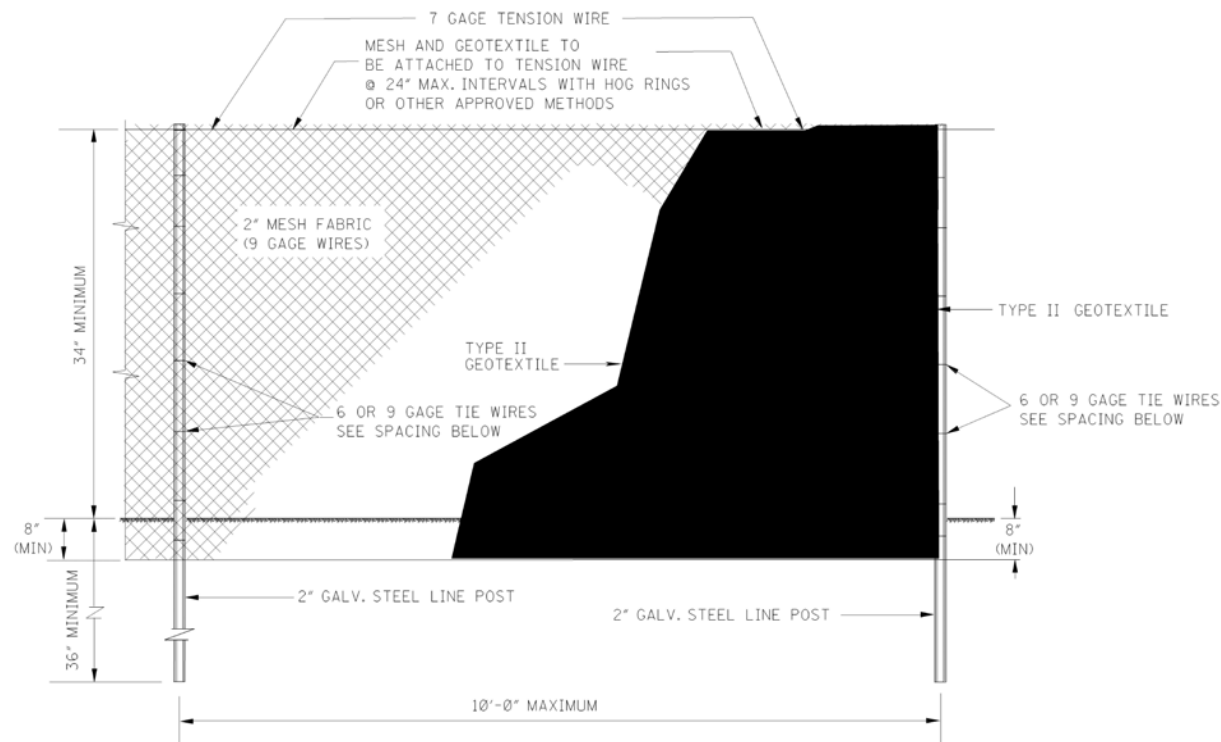


PLAN VIEW

REQUIRED LAPPING

MISSISSIPPI DEPARTMENT OF TRANSPORTATION			
DETAILS OF SILT FENCE INSTALLATION			
BY	DESIGN	DATE	WORKING NUMBER
			ECD-3
FILENAME: EROSION_CONTROL\ECD-3.DGN	DESIGN TEAM	CHECKED	SHEET NUMBER

STATE	PROJECT NO.
MISS.	



TENSION WIRE TIE DETAILS

6 OR 9 GAGE TIE WIRE SPACING	
TOTAL TEST LOAD (lbs)	TIE WIRE SPACING (C-C)
518	12"
475-517	11"
430-474	10"
387-429	9"
344-386	8"
301-343	7"
258-300	6"

MISSISSIPPI DEPARTMENT OF TRANSPORTATION			
<b>SUPER SILT FENCE</b>			
DATE	DESIGN	CHECKED	DATE
FILENAME: SSF-1.DGN	WORKING NUMBER		
DESIGN TEAM	SSF-1		
SHEET NUMBER			