

G. **Silt Fence.** (See Standard Specifications manual item 642S and Standards manual 642S-1 for details)

1. **Description.**

Silt Fence is a temporary barrier made of non-woven polypropylene, polyethylene, or polyamide material that is trenched or sliced into the ground and supported by posts on the downstream side of the fabric. Silt fence works by intercepting sheet flow from slopes, causing the runoff to pond behind the fence, thereby promoting deposition of sediment on the uphill side of the fence. They are most effective when designed to provide comprehensive water and sediment control throughout a construction site and if used in conjunction with erosion control practices.

A common misconception among many designers is that the silt fence actually "filters" suspended particles from runoff. The effectiveness of silt fence is primarily derived from its ability to pond water behind the fence. This ponding action allows suspended particles to settle out on the uphill side of the fence. Particles are not removed by filtering the runoff through the fabric.

2. **Purpose.**

Used to control sheet flow runoff from disturbed land, silt fencing may also be used to create a sediment trap for removal of suspended particles from low volume concentrated flows. The removal efficiency of silt fencing depends mainly on the detention time of the runoff behind the control. The detention time is controlled by the geometry of the upstream pond, hydraulic properties of the fabric, and maintenance of the control (Barrett et al., 1998).

3. **Conditions Where Practice Applies.**

Silt fence is used during the period of construction near the perimeter of a disturbed area to intercept sediment. This fence shall remain in place until the disturbed area is permanently stabilized. Silt fence should not be used where there is a concentration of water in a channel or drainage way or where soil conditions prevent a minimum toe-in depth of six (6) inches or installation of support post to a minimum depth of 12 inches. If concentrated flow occurs after installation, corrective action must be taken such as placing rock berms in the areas of concentrated flow.

4. **Design Criteria.**

Silt fence is typically constructed near the perimeter of a disturbed site within the developing area. It is not to be constructed outside the property lines without obtaining a legal easement from the affected adjacent property owners.

The following criteria shall be observed:

- Drainage Area - Consult Table 1.4.5.G.1 for maximum drainage area allowed for a specific slope category. If the drainage area to the silt fence exceeds this value, additional silt fence should be installed to break up the runoff into multiple storage areas.
- Height - 24 inch minimum height measured from the existing or graded ground.

For Design purposes use the following criteria:

- Assume a construction Total Suspended Solids (TSS) concentration = 3000 mg/L.
- Use a target removal of sediment particle equal to or greater than diameter (d) = 20 microns.

- Use the Influent Particle size distribution of the solids suspended in runoff shown in Figure 1.4.5.G (Barrett et al., 1998).

A. Overland flow:

1. General guidelines. Silt fence for sediment and slope control should be installed along the contour of the slope (i.e. the entire length should be at the same elevation). The maximum drainage area to the silt fence should not exceed those shown on Table 1.4.5.G.1. The spacing criterion is based on the maximum drainage area, in square feet, above a 100 foot wide section of silt fencing. At each end of the silt fence, a minimum 20-foot segment shall be turned uphill to create a "J" hook (see "J"-hook detail) to prevent ponded water from flowing around the ends of the silt fence. Individual sections of silt fence should be limited to 200-foot lengths. This limits the impact if a failure occurs, and prevents large volumes of water from accumulating and flowing to one end of the installation, which may cause damage to the fence.
2. Sediment control. When used for sediment control, silt fence should be located to provide the storage volume behind the fence that will contain the runoff from the 2 year storm. Table 1.4.5.G.1 provides the spacing on uniform slopes necessary to achieve this storage volume. If the designer proposed an alternative configuration, it must be demonstrated that 2 year storm runoff volume is contained and released in a manner such that the effluent concentration does not exceed effluent standards of City of Austin Code Title 6, Article 5 as well as the baseline TSS conditions in ECM 1.6.9.3 Table 1-10. The design presumptions are stated above.

Larger storage volumes increase the sediment removal efficiency of the silt fence, and decrease the required replacement/clean-out intervals.

A common location to place silt fence for sediment control is at the toe of a slope. When used for this application, the silt fence should be located at least five (5) feet from the toe of the slope to ensure that a large storage volume is available for runoff and sediment.

For sediment control applications, the maximum drainage area to the silt fence should not exceed those shown on Table 1.4.5.G.1. If the contributing area exceeds this value, additional silt fence should be installed to break up the runoff into multiple storage areas. When used as a velocity control measure for sheet flow on long slopes of disturbed ground, silt fence should be placed at the spacing interval and not exceed the drainage area to the fence stated in the table below:

3. Slope control. Silt fence can be installed on a slope to reduce the effective slope length and limit the velocity of runoff flowing down the slope (see Table 1.4.5.G.1). Silt fence also helps prevent concentrated flows from developing, which can cause rill and gully erosion. As a secondary benefit, silt fence installed on slopes can remove suspended sediment from runoff that results from any erosion that has occurred. For slopes that receive runoff from above, a silt fence should be placed at the top of the slope to control the velocity of the flow running onto the slope, and to spread the runoff out into sheet flow.

<b>Table 1.4.5.G.1: Maximum spacing between silt fences on slopes</b>		
<b>Slope</b>	<b>Spacing Interval (ft)</b>	<b>Max. Drainage Area (sf)</b>
100:1 to 50:1 (1-2%)	500	25,000
50:1 to 30:1 (2-3.3%)	250	15,000
30:1 to 25:1 (3.3-4%)	150	12,000
25:1 to 20:1 (4-5%)	120	10,000
20:1 to 10:1 (5-10%)	100	5,000
10:1 to 5:1 (10-20%)	50	2,500
5:1 to 2:1 (20-50%)	10	1,000

4. Perimeter control. Silt fence is commonly used as a perimeter control along streets or adjacent to water bodies to prevent polluted water from leaving the site. When a diversion or perimeter control silt fence is installed in the direction of a slope, a 20-foot length of fence should be turned in, across the slope, at regular intervals (100 feet) to create a "J"-hook (see "J" hook detail).

These "J"-hooks act as check dams, controlling the velocity of the diverted runoff as it travels along the fence.

- B. Concentrated flow. Not allowed

- C. Diversion. Silt fence can also be utilized as a synthetic diversion structure to redirect clean water around a site and intercept sediment-laden runoff and transport it to a sediment removal practice. Must demonstrate additional BMPs designed to prevent rill/gully erosion due to concentrated flow along the perimeter of the silt fence.

5. Materials Specifications.

See City of Austin Standard Specifications 642S for material specification and installation details.

6. Troubleshooting

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Repair undercut silt fences.

- Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months.
- Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed of, and replaced with new silt fence barriers.
- Sediment that accumulates in the silt fence must be periodically removed in order to maintain silt fence effectiveness. Sediment should be removed when the sediment accumulation reaches approximately one-half of the fence height (one foot) on the silt fence. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location. Upon removal of silt fence, accumulated sediment must also be removed and disposed of properly.
- Silt fences should be left in place until the upstream area is permanently stabilized. Until then, the silt fence must be inspected and maintained.
- Holes, depressions, or other ground disturbance caused by the removal of the silt fences should be backfilled and repaired.

**Figure 1.4.5.G Influent Particle Size Distribution of the Suspended Solids in Runoff.**

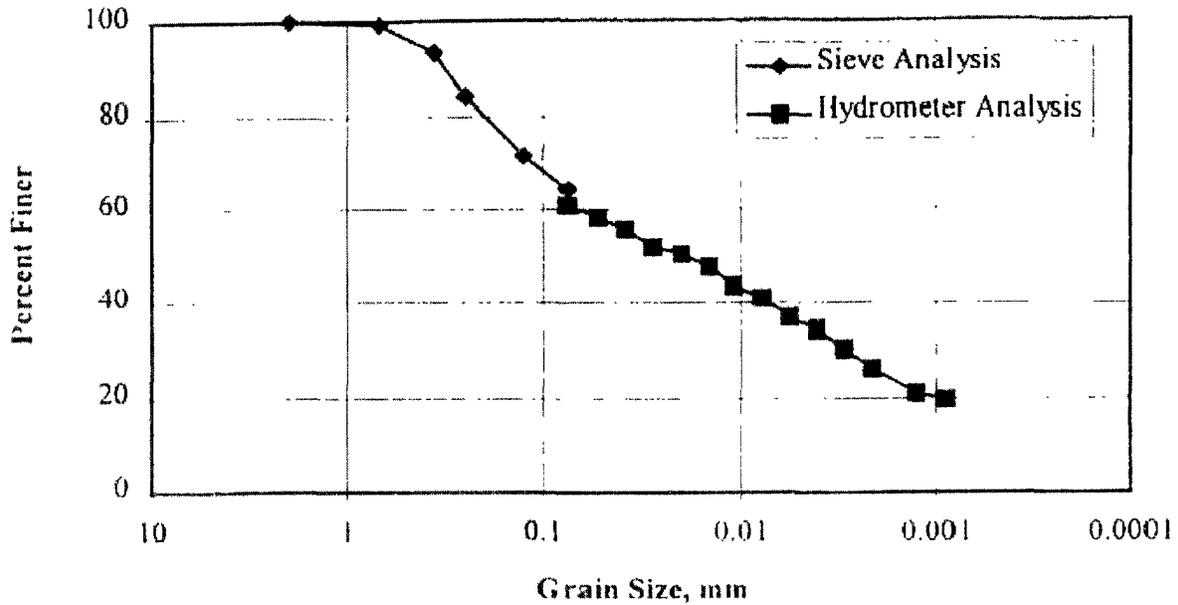


Figure 1.4.5.G.1 Silt Fence Installation

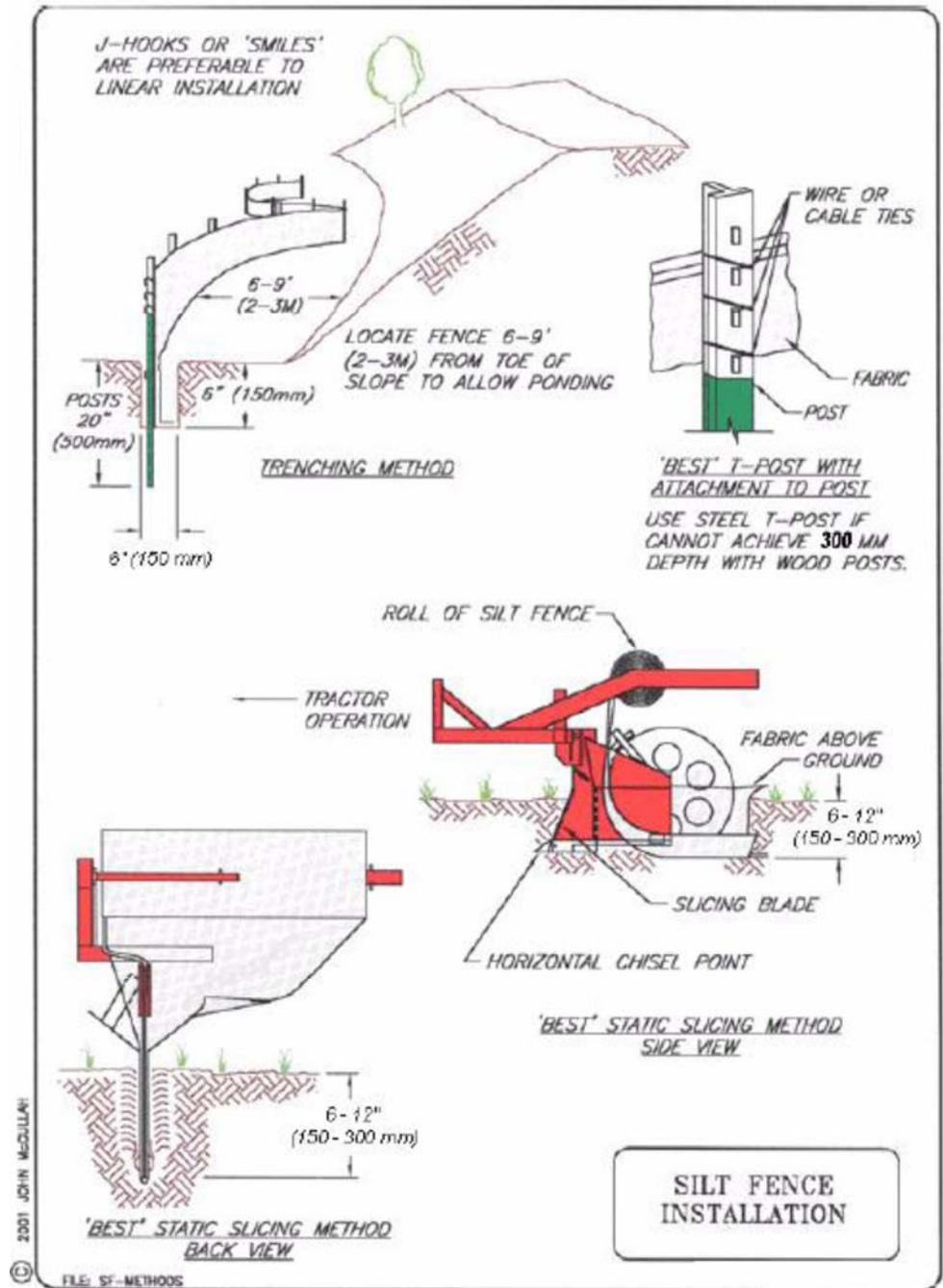


Figure 1.4.5.G.2 Silt Fence Placement — One Slope

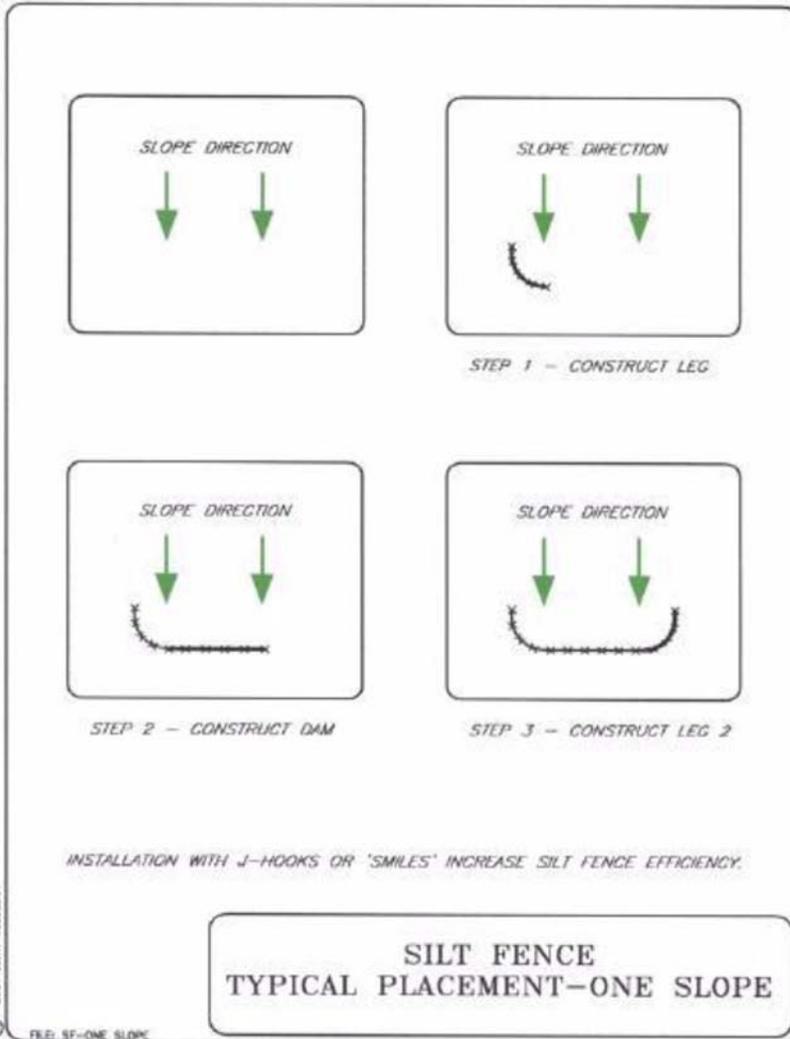


Figure 1.4.5.G.3 Silt Fence Placement for Perimeter Control

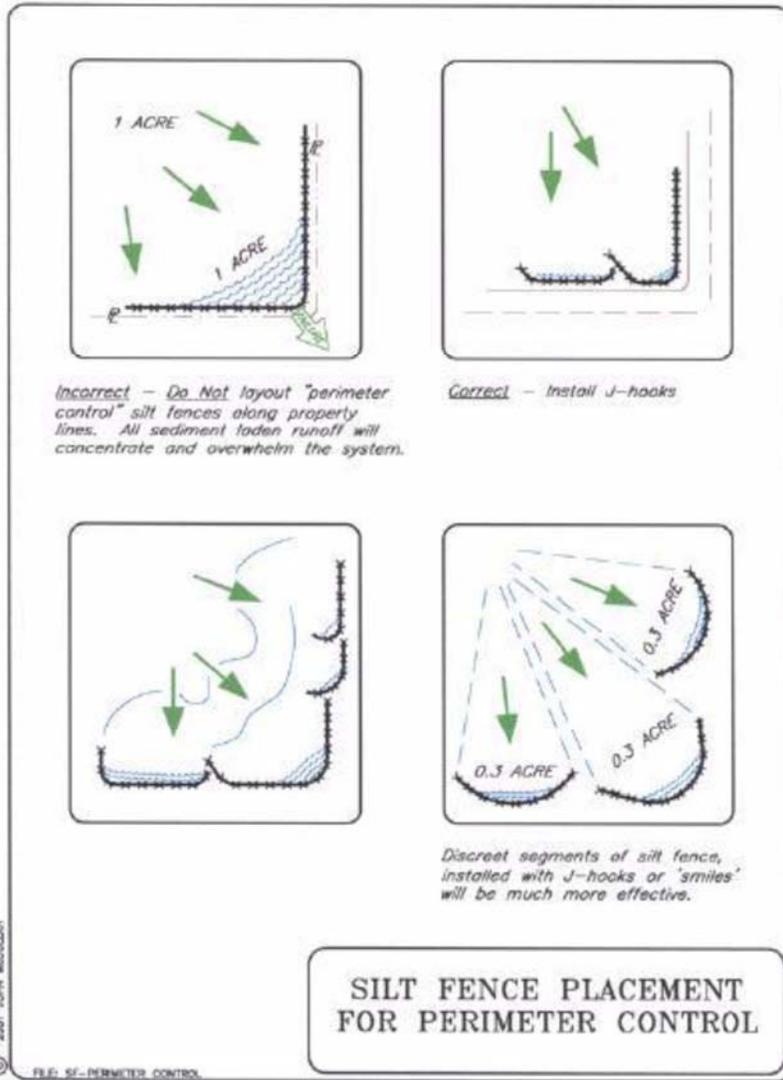


Figure 1.4.5.G.4 Silt Fence J - Hook Detail

