

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
DRAFT TECHNICAL STANDARD
PERIMETER SEDIMENT CONTROL AND SLOPE INTERRUPTION
1056

DEFINITION

A practice used to intercept and detain sheet flow runoff from small areas of disturbed soil. Examples include silt fence and manufactured products such as straw wattles.

PURPOSE

The purpose of this standard is to reduce the discharge of sediment in runoff from small areas at construction sites. The standard includes common methods which may be used to meet this purpose.

CONDITIONS WHERE PRACTICE APPLIES

This standard applies in areas of construction sites where only *sheet and rill erosion*¹ occur and sediment control is needed prior to discharge from the site. These are typically perimeter areas but may include internal areas (e.g., temporary soil stockpiles) if appropriate. This standard also applies in areas of construction sites where slope interruption devices are needed to minimize the potential for concentrated flow forming on long or steep slopes.

This standard does not apply to:

- Locations below the ordinary high water mark of waterways or within wetlands without permission from the Wisconsin Department of Natural Resources (WDNR);
- Any area of concentrated flow, including ditches or swales; or
- In areas where the slope in the contributing drainage area is steeper than 50% (2H:1V).

CRITERIA

This section establishes the minimum standards for design, installation and performance requirements.

General Criteria (Silt Fence and Manufactured Products)

Laws and Regulations. Comply with applicable federal, tribal, state, and local laws, rules, regulations, or permit requirements including but not limited to those relating to Diggers Hotline, safety, and spills. This standard does not contain the text of federal, tribal, state, or local laws.

Location. Locate perimeter sediment controls on the contour to the maximum extent possible to create temporary ponding areas where particle settling can occur with the ends extended upslope to prevent water from flowing around the ends (see Figure 1).

Design Parameters. Install perimeter sediment controls to form J-Hooks (see Figure 2) where needed to maximize ponding areas.

For contributing drainage areas with slopes steeper than 33% (3H:1V) (e.g., soil stockpiles), maintain a ponding area between the toe of the slope and the perimeter sediment controls. The ponding area should be as flat as possible with perimeter sediment controls located at least 10 feet from the toe of the

¹ Words in the standard that are shown in italics are described in the Glossary section. The words are italicized the first time they are used in the text.

slope. The 10-foot ponding area does not need to be considered toward the slope length and contributing drainage area limitations for slopes steeper than 33% (3H:1V) (see Tables 1 and 2).

Install perimeter sediment controls prior to disturbing the contributing drainage area.

Contributing Drainage Area – Silt Fence

Identify appropriate locations for silt fence so that slope lengths in the contributing drainage area do not exceed the criteria in Table 1.

Table 1			
Average Slope	Slope Length	Maximum Contributing Drainage Area Per 100 Feet of Silt Fence	
(%)	(Feet)	(Square Feet)	(Acres)
< 2	100	10,000	0.23
2 to 5	75	7,500	0.17
5 to 10	50	5,000	0.11
10 to 33	25	2,500	0.06
> 33	20	2,000	0.05

It is acceptable to use silt fence relief ditch checks (see Figure 3) where a low point in a silt fence line is unavoidable, provided the contributing drainage area to the low point is less than one acre.

For silt fence relief, design and install ditch checks in accordance with WDNR Technical Standard 1062 Ditch Check.

The installation of silt fencing using J-Hooks to break up drainage areas should be implemented instead of silt fence relief ditch checks where feasible.

Do not use silt fence for slope interruption.

Contributing Drainage Area – Manufactured Products

Identify appropriate locations for manufactured perimeter control products so that slope lengths in the contributing drainage area do not exceed the criteria in Table 2 for the selected product height class in Table 3.

Table 2					
Average Slope	Slope Length (feet) per Product Height Class				
(%)	I	II	III	IV	V
< 2	30	30	55	75	100
2 to 5	25	25	40	55	75
5 to 10	15	15	30	40	50
10 to 33	0	10	15	20	25
> 33	0	5	10	15	20

Table 3	
Product Height Class	Installed Product Height Above Grade (inches)
Class I	<i>Mat Products</i>
Class II	6-9
Class III	10-15
Class IV	16-20
Class V	> 20

It is acceptable to use manufactured perimeter control products for slope interruption when installed in rows that are spaced in accordance with Table 2 (see Figure 4).

Use product manufacturer recommendations if more restrictive than Table 2.

Material Specification – Silt Fence

Use geotextile fabric consisting of either woven or non-woven polyester, polypropylene, stabilized nylon, polyethylene, or polyvinylidene chloride. Non-woven fabric may be needle punched, heat bonded, resin bonded, or combinations thereof.

Use fabric that meets the Wisconsin Department of Transportation (WisDOT) Standard Specifications for Highway and Structure Construction criteria in Table 4.

Table 4		
Test Requirement	Method	Value ¹
Minimum grab tensile strength in the machine direction	ASTM D 4632	120 lbs. (550 N)
Minimum grab tensile strength in the cross machine direction	ASTM D 4632	100 lbs. (450 N)
Maximum apparent opening size equivalent standard sieve	ASTM D 4751	No. 30 (600 µm)
Minimum permittivity	ASTM D 4491	0.05 scc ⁻¹
Minimum ultraviolet stability percent of strength retained after 500 hours of exposure	ASTM D 4355	70%

¹ All numerical values represent minimum / maximum average roll values. (For example, the average minimum test results on any roll in a lot should meet or exceed the minimum specified values.)

Silt fence shall have a maximum flow rate of 10-gallons/minute/square foot at 50mm constant head as determined by multiplying permittivity in 1/second as determined by ASTM D-4491 by a conversion factor of 74.

Material Specification – Manufactured Products

Use temporary ditch check products identified on the WisDOT Erosion Control Product Acceptability List (PAL) or manufactured perimeter control and slope interruption products identified on the Wisconsin Department of Safety and Professional Services (DSPS) Approved Product List.

It is acceptable to fill products with compost, wood chips or crushed stone if recommended by the manufacturer.

For products filled with compost, use compost that meets WDNR Specification S100 Compost for Storm Water Management.

For products filled with reused materials regulated as solid waste, use materials that have received a WDNR exemption under NR 500, Wis. Adm. Code.

For products that include water-applied additives, use water applied additives that comply with WDNR allowable usage rates.

Note: WDNR maintains a list of additive allowable usage rates at <https://dnr.wisconsin.gov/topic/Wastewater/Additives.html>

Installation – Silt Fence (see Figure 5)

Install silt fence so it has a minimum of 14 inches but not more than 28 inches of height above the ground surface.

Use silt fence with support cords near the top of the fence and tighten them to provide support.

Support silt fence using either wood or steel support posts on the downslope side of the silt fence.

Space support posts along the fence no more than 3 feet apart for non-woven fabric or 8 feet apart for woven fabric.

Install support posts with a minimum of 20 inches of post below the ground surface.

Where joints are necessary, secure each end of the fabric to a support post and wrap around each other to produce a stable and secure joint (Twist Method). Alternatively, use the Hook Method (see Figure 5).

Wrap the fabric around the terminal ends of the silt fence such that the staples are not visible.

Wood Support Posts

Use posts that are a minimum of 3 feet long for 24-inch wide rolls of silt fence and at least 4 feet long for 36-inch wide rolls of silt fence.

Support full height of silt fence using 1-1/8-inch by 1-1/8-inch air or kiln dried hickory or oak posts.

Staple silt fence on upslope side of posts in at least 3 places using at least 0.5-inch staples.

Do not use plastic tie straps or wire fasteners with wood support posts.

Steel Support Posts

Use steel posts that are at least 5 feet long with projections for the attachment of fasteners.

Support the full height of the silt fence using posts with a strength of 1.25 pounds per linear feet.

Attach silt fence fabric in at least three places using 50-pound plastic tie straps or wire fasteners.

Anchor silt fence using either a trench or the slicing method:

- **Trench.** Spread at least 8 inches of silt fence fabric in a 4-inch wide by 6-inch deep trench or a 6-inch deep V-trench on the upslope side of the fabric. Backfill and compact the trench after fabric placement.
- **Slicing.** Use a slicing machine that provides equivalent anchoring to the trench method.

Installation – Manufactured Products

Overlap products a minimum 24 inches or as required by the manufacturer if more restrictive. Shingle the overlap in the direction of flow. Do not allow gaps between adjacent, overlapping products.

Stake or anchor as needed to maintain constant ground contact along the entire length of product and prevent lateral movement and/or floatation. Perform staking or anchoring per product manufacturer recommendations.

Entrench to ensure continuous ground contact as recommended by the product manufacturer.

To prevent undercutting, fill any gaps and ruts under the installed product with soil or *log-type product* filler media.

Do not stack products individually on top of one another unless allowed in the manufacturer's recommended installation procedures.

CONSIDERATIONS

The following are not required but are recommendations:

- (1) Perimeter sediment controls are highly susceptible to overtopping or undercutting when subjected to concentrated flows or runoff from drainage areas that exceed the slope or slope length criteria.
- (2) Proper trenching of silt fence and manufactured products is critical to prevent undercutting.
- (3) Avoid using perimeter sediment controls to define property boundaries or construction limits. This approach can result in perimeter control installations that are not installed on contour, creating low points where overtopping or undercutting occurs.
- (4) When placing silt fence near trees, take care to minimize damage to the root system. Avoid compaction and root cutting within 1.5 feet multiplied by the inch diameter of the tree (for example: for 10-inch trees keep out a 15-foot radius from the trunk). Refer to UW-Madison Division of Extension publication Preserving Trees During Construction for more information.
- (5) Protect perimeter controls from damage in areas of active construction or heavy traffic using flagging or other methods to improve visibility.
- (6) To further support silt fence, place wire fencing or staked straw bales (see WDNR Technical Standard 1055 Sediment Bale Barrier) on the down slope side.
- (7) To help ensure effectiveness, inspect and repair perimeter controls as necessary prior to forecasted rain events.
- (8) Where installation with wood posts is difficult, such as when hard or frozen ground is encountered, the use of steel post is recommended.
- (9) Where perimeter control is placed adjacent to wetland boundaries, add high visibility fencing or signage to discourage intrusion into wetlands.

PLANS AND SPECIFICATIONS

Specify the material options within the specifications for the project. Include the proposed product height class for manufactured perimeter control devices.

Depict the proposed location of perimeter controls on the erosion control plans in accordance with the criteria of this standard and describe the requirements for applying the practice to achieve its intended use. Include the location of J-hooks or smile alignments where appropriate. Label locations where the placement requires modification after major grading operations.

OPERATIONS AND MAINTENANCE

General (Silt Fence and Manufactured Products)

Inspect perimeter sediment control practices at a minimum weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period.

Repair or replace any perimeter sediment controls that are damaged or decomposed.

Remove accumulated sediment when deposits reach $\frac{1}{2}$ the height of the perimeter sediment control practice.

If a perimeter control practice becomes undermined, backfill the voids with soil and compacted to prevent water flow under the practice.

Remove perimeter sediment controls once the contributing drainage area is *permanently stabilized*. After removal, dispose of perimeter sediment controls properly.

Manufactured Products

If a manufactured product rolls out of position, reposition the product and secure with additional stakes.

It is acceptable to repair *small holes* in a log-type product by stitching or wrapping a new piece of fabric around the product and securing. For log-type product with larger holes, rips, or tears, remove and replace with new product or a second log-type product may be placed immediately upslope with a minimum 24 inches of overlap beyond the hole, rip, or tear.

Re-contour pinched, settled, or deformed log-type products to their original diameter by hand if possible or a second log-type product shall be placed immediately upslope with a minimum 24-inch overlap beyond the deformation.

Remove and replace destroyed or irreparable sections of log-type product with new log-type product or a second log-type product may be placed immediately upslope with a minimum 24-inch overlap beyond the deformation.

Replace mat products when visible sediment covers 50% of the installed width or if damaged or degraded. A second mat may be placed immediately adjacent to or on top of the first mat in lieu of replacement.

REFERENCES

Binnie, Stan, Preserving Trees During Construction, University of Wisconsin Extension Publication A0327, October 1, 1994.

Wisconsin Department of Transportation, Erosion Control Product Acceptability List (PAL), <https://wisconsindot.gov/pages/doing-bus-eng-consultants/cnslt-rsrcs/tools/pal/default.aspx>.

Wisconsin Department of Transportation, Standard Specifications for Highway and Structure Construction, 2022.

Wisconsin Department of Safety and Professional Services, Manufacturers of Approved Building Materials Database, <https://dsps.wi.gov/Pages/Programs/CommercialBuildings/Default.aspx>.

GLOSSARY

Log-Type Products: Sediment control products constructed of an outer sock of geotextile or other type of netting or permeable containment media surrounding an inner filtering media.

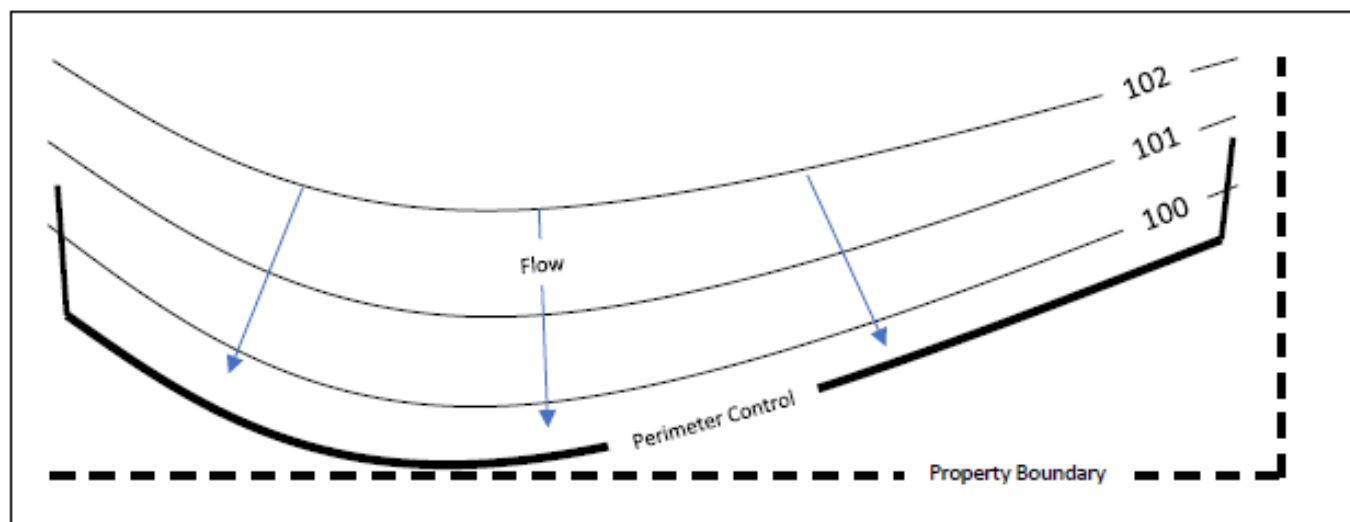
Mat Products: Low profile products consisting of one or more layers of fibrous material designed to slow and filter runoff.

Permanently Stabilized: Disturbed areas in the contributing drainage area have been vegetated or covered so that perimeter sediment control is no longer needed.

Sheet and Rill Erosion: Sheet and rill erosion is the removal of soil by the action of rainfall and shallow overland runoff. It is the first stage in water erosion. Rills occur as flow starts to concentrate. As soil detachment continues or flow increases, rills will become wider and deeper forming gullies.

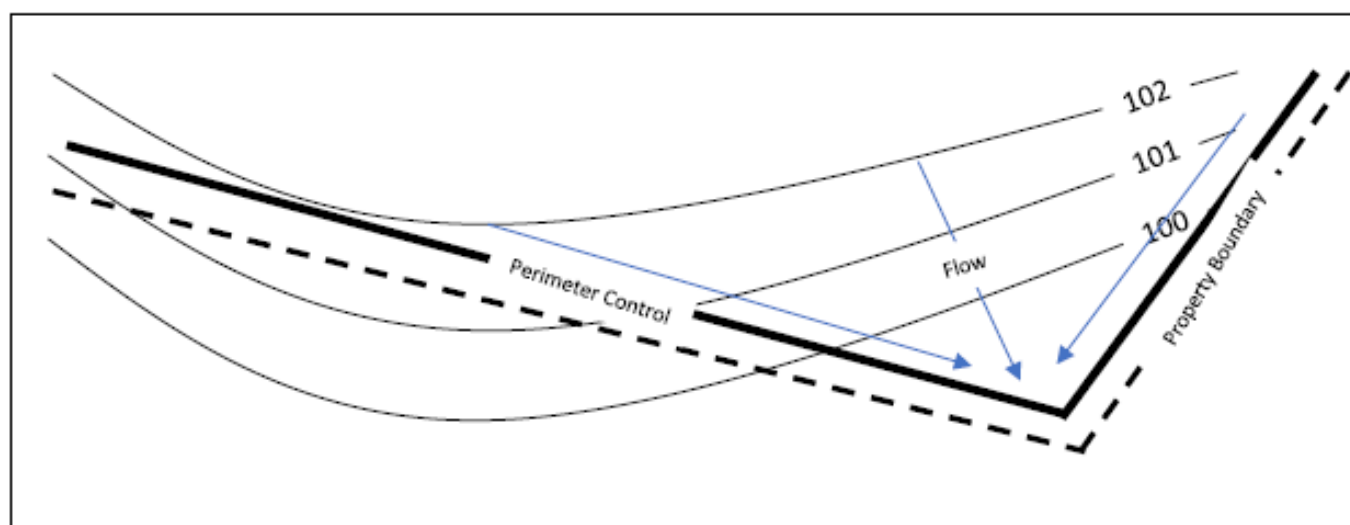
Small Holes: Holes that are less than 12 inches long and less than ½ inch wide located within the top 1/3rd of the log-type product.

**Figure 1:
Placement on Contour**



CORRECT PLACEMENT

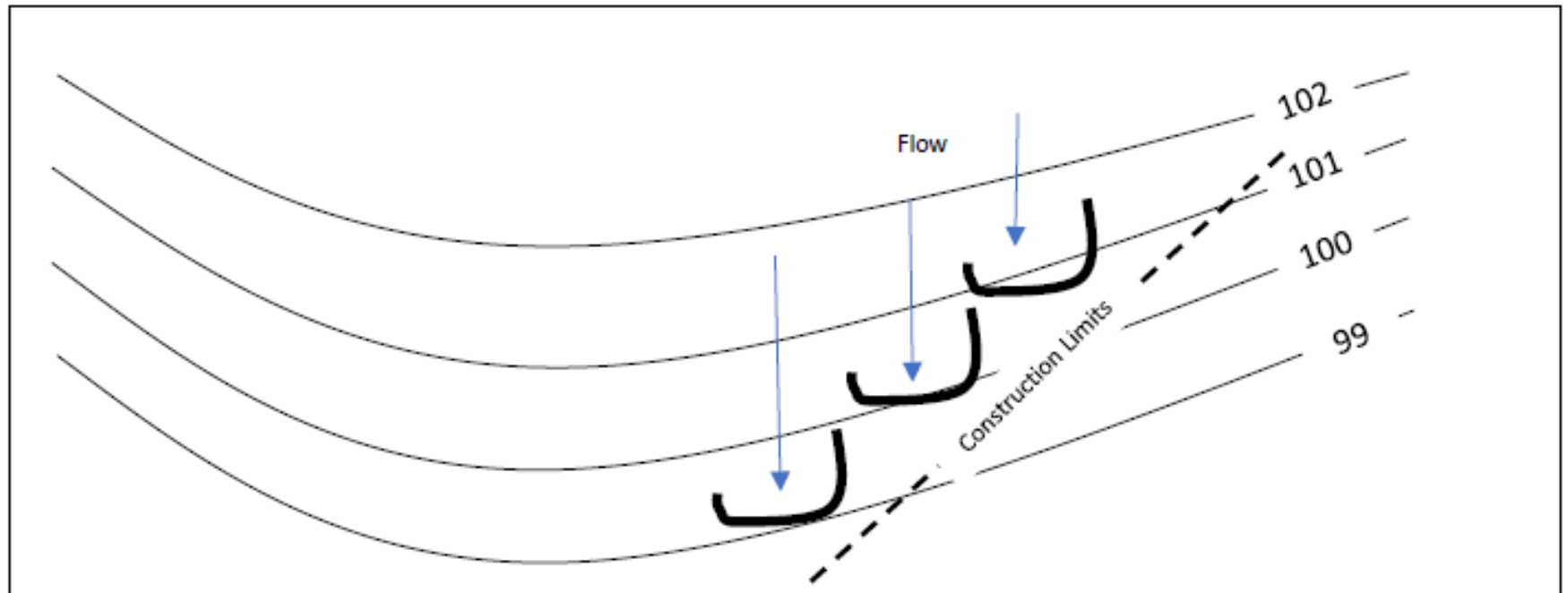
Install perimeter control on contour and turn the ends upslope. This will create the largest potential ponding area to maximize sediment removal efficiency.



INCORRECT PLACEMENT

Do not install perimeter control along property boundaries, construction limits, roadways or other features that are not on contour. Installing perimeter control without regard to contour will cause runoff to concentrate at the low point and overwhelm the practice at this location.

Figure 2:
J-Hooks



**Figure 3:
Silt Fence Relief**

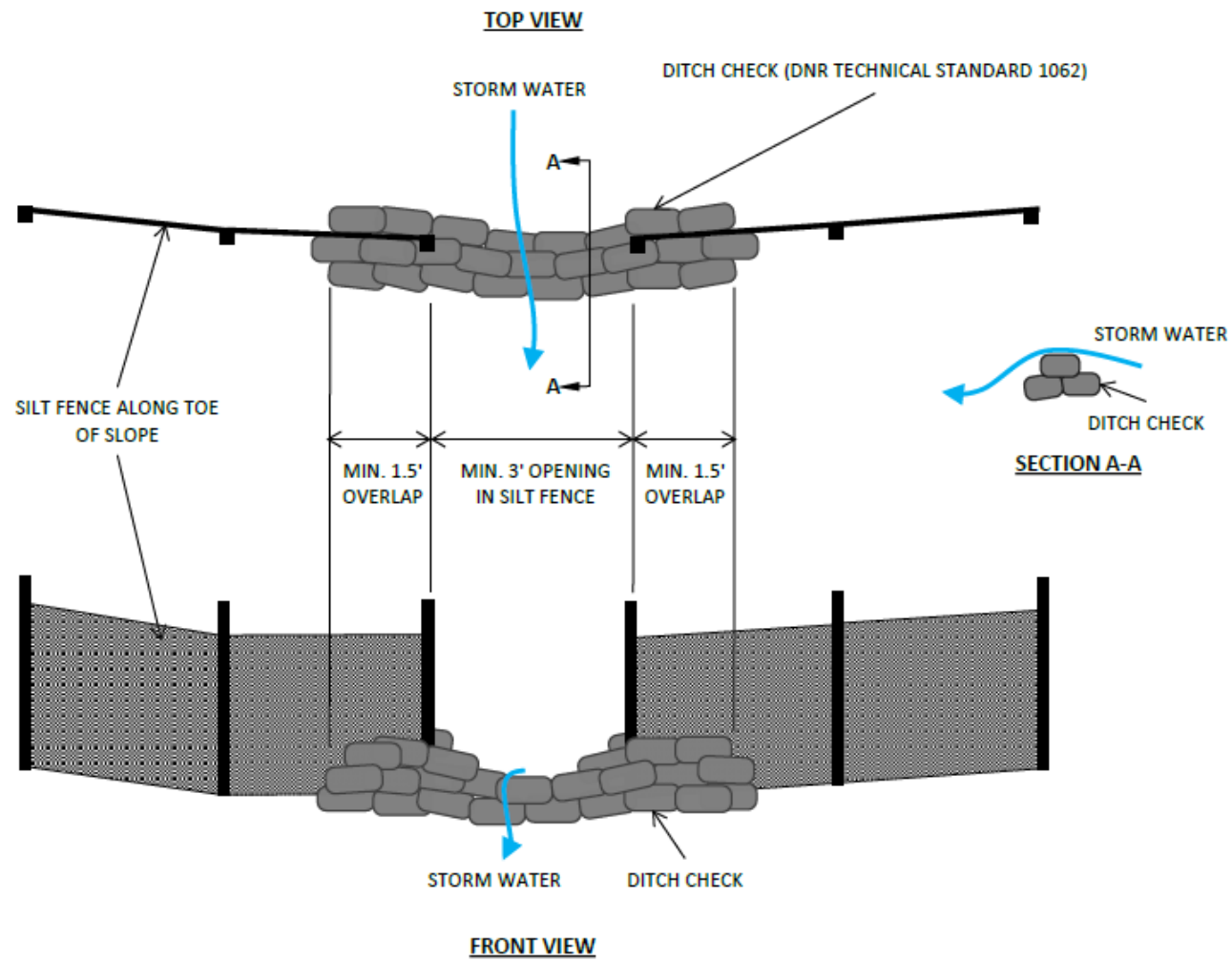


Figure 4:
Slope Interruption

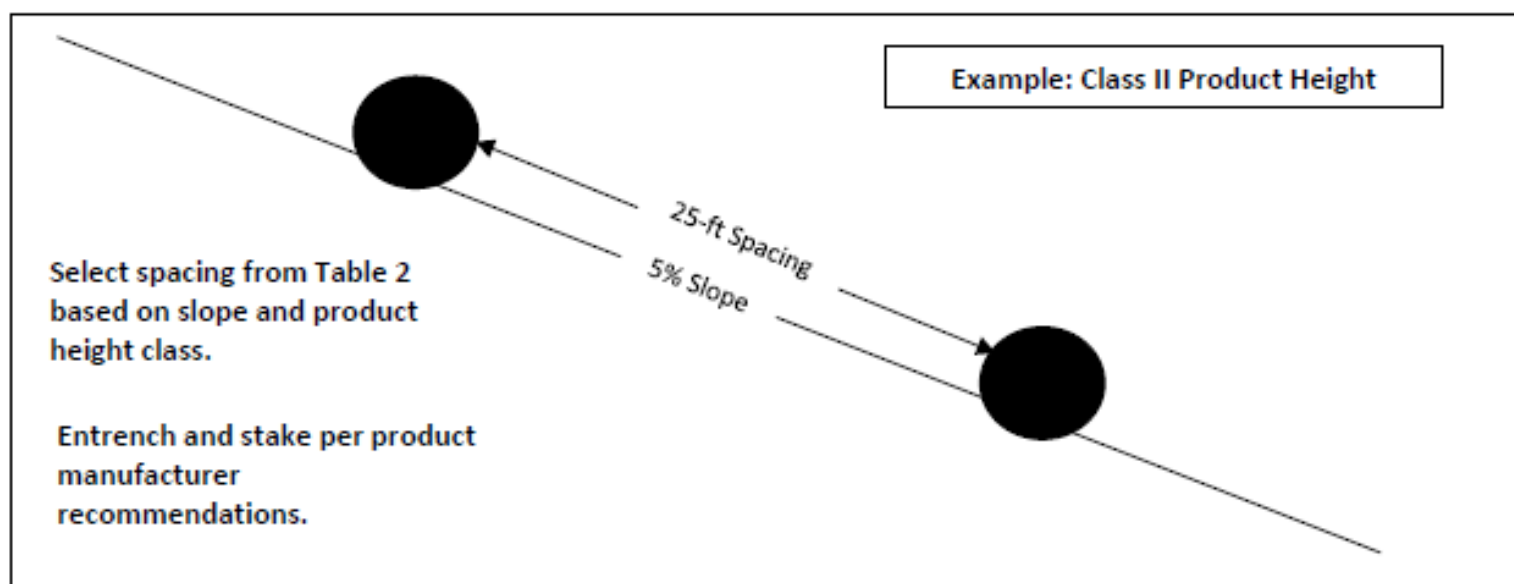
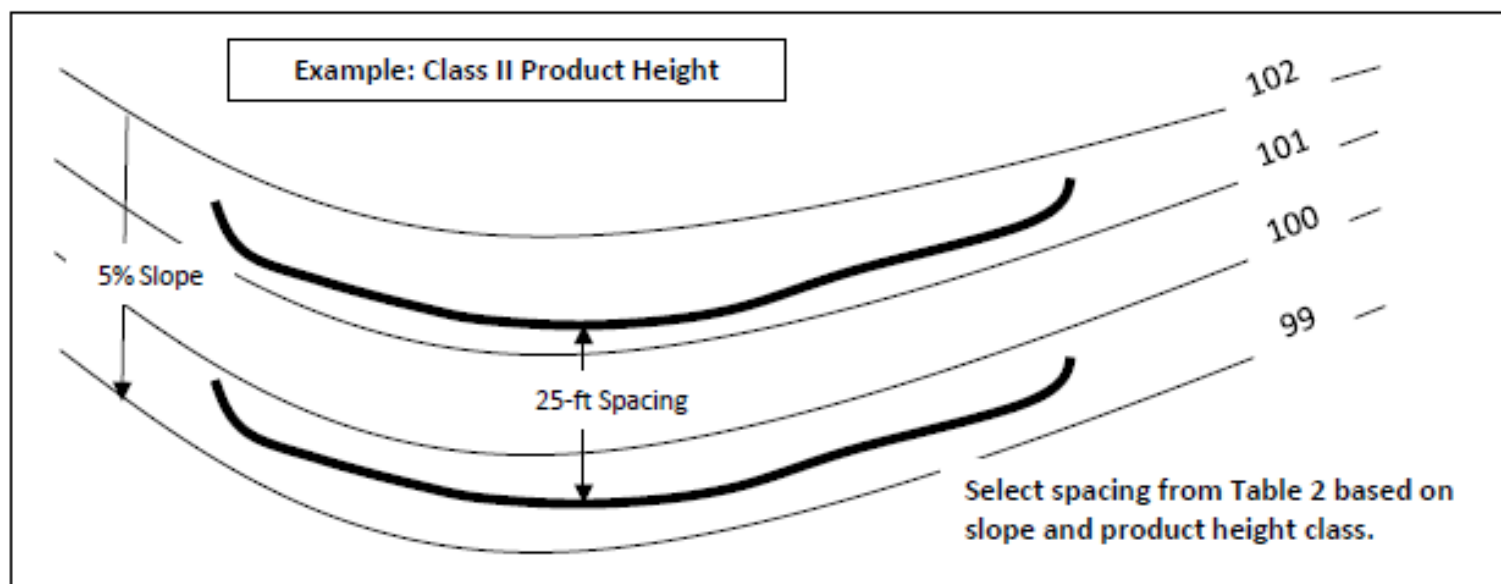


Figure 5: Silt Fence Installation

