

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

DEFINITION

A practice used to intercept sheet flow from small areas of disturbed soil and encourage ponding of runoff to allow sediment to settle out. Examples include silt fence and manufactured products such as wattles, sediment logs and geotextile socks filled with natural materials.

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 or part of a treatment train) 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 reporting or non-reporting permit coverage from the Wisconsin Department of Natural Resources (WDNR);
- Any area of concentrated flow, including ditches or swales; or

Note: Manufactured products can be used as ditch checks in accordance with WDNR Technical Standard 1062 Ditch Check.

- In areas where the slope in the contributing drainage area is steeper than 50% (2H:1V).

Note: Runoff from slopes steeper than 50% should be directed to sediment basins/traps or a flat ponding area should be maintained between the toe of the slope and the perimeter sediment controls.

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).

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.

Design Parameters. Install perimeter sediment controls to form a series of *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 slope when possible. 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.

Note: When contributing drainage area conditions are not appropriate for silt fence, runoff should be directed to sediment basins or traps.

Table 1				
Average Slope		Slope Length	Maximum Contributing Drainage Area Per 100 Feet of Silt Fence	
(%)	(H:V)	(Feet)	(Square Feet)	(Acres)
<2	<50:1	100	10,000	0.23
2 to 5	50:1 to 20:1	75	7,500	0.17
5 to 10	20:1 to 10:1	50	5,000	0.11
10 to 33	10:1 to 3:1	25	2,500	0.06
33 to 50	3:1 to 2:1	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.

When silt fence relief ditch checks are used, design and install the ditch check component in accordance with WDNR Technical Standard 1062 Ditch Check. Install silt fence relief openings that are between 3 and 8 feet wide based on the size of the contributing drainage area.

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.

Note: When contributing drainage area conditions are not appropriate for manufactured products, runoff should be directed to sediment basins or traps.

Table 2					
Average Slope		Slope Length (feet) per Product Height Class			
(%)	(H:V)	I	II	III	IV
<2	<50:1	30	55	75	100
2 to 5	50:1 to 20:1	25	40	55	75
5 to 10	20:1 to 10:1	15	30	40	50
10 to 33	10:1 to 3:1	10	15	20	25
33 to 55	3:1 to 2:1	5	10	15	20

Table 3	
Product Height Class	Product Height (inches)
Class I	6-9
Class II	10-15
Class III	16-20
Class IV	> 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 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 geotextile that meets the 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.)

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.

NOTE: Temporary ditch check products on the WisDOT PAL have product heights of at least 12 inches. It is acceptable to use smaller versions of these products for perimeter control or slope interruption applications.

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 with a minimum height of 24 inches above the ground surface.

Anchor silt fence by constructing a trench on the upslope side of the fence or use a slicing machine that provides anchoring equivalent to a trench.

Construct an anchoring trench that is at least 4 inches wide and 6 inches deep. Spread the excess fabric in the trench, backfill the trench with soil and compact the soil.

Install wood support posts on the downslope side of the silt fence that support the full height of the fence. Use hardwood posts (e.g., oak, hickory) with a minimum size of 1-1/8 inch by 1-1/8 inch and at least 4 feet long.

Space support posts along the silt fence no more than 3 feet apart for non-woven fabric or 8 feet apart for woven fabric and install the posts at least 2 feet below the ground surface.

Staple silt fence on the upslope side of the posts in at least 3 places using at least 0.5-inch staples. At the end posts, wrap the fabric so that the staples are not visible.

Use silt fence with support cords or tension tape near the top of the fence and tighten to provide top support.

When joints are necessary, joint two lengths of silt fence using either the Twist Method or the Hook Method as shown on Figure 5.

Use silt fence with support cords or tension tape near the top of the fence and tighten to provide adequate top support.

Use steel support posts only when needed in compacted soil conditions or locations where higher support strength is necessary. Steel support posts should be at least 5 feet long with a strength of 1.25 pounds per linear feet and projections for the attachment of fasteners. Fabric should be attached to steel posts in at least three places using 50-pound plastic tie straps or wire fasteners.

Installation – Manufactured Products

Overlap products a minimum 24 inches or as required by the manufacturer if more restrictive. 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.

On disturbed ground, trench a minimum of 2 inches to ensure continuous ground contact. On vegetated, erosion matted or frozen ground, products may be installed without entrenchment per product manufacturer recommendations.

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) Consider drainage patterns during all phases of construction to avoid subjecting perimeter controls to concentrated flows or runoff from drainage areas that exceed the slope or slope length criteria.
- (2) 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.
- (3) 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).
- (4) In wooded areas, use manufactured products instead of silt fence when tree preservation is a goal.
- (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, use wire back silt fence or install 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) Steel posts can pose a hazard for snowmobiles and ATVs and should be avoided in areas where snowmobile and ATV traffic is possible.
- (10) Where perimeter control is placed adjacent to wetland boundaries, add high visibility fencing or signage to discourage intrusion into wetlands.
- (11) To prolong the life of log-type products, stakes should be crossed over the product instead of piercing the fabric.
- (12) For manufactured products that are filled with wood material, consider using recycled wood materials diverted from landfills.
- (13) It is acceptable to install redundant perimeter controls (e.g., double-row silt fence) adjacent to wetlands or other sensitive areas. However, redundant perimeter controls are considered one practice for design purposes.

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 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.

It is acceptable to install an additional row of silt fence upslope from the initial row provided the accumulated sediment has been removed from the initial row.

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.

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.

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-form 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.

REFERENCES

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. <https://wisconsindot.gov/pages/doing-bus/eng-consultants/cnslt-rsrcs/rdwy/stnds-spec.aspx>.

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

GLOSSARY

J-Hooks: A perimeter control installation method used to avoid long runs that have the potential to create a concentration of runoff in one section. J-Hooks break up the long run and create separate areas for ponding and settling to occur.

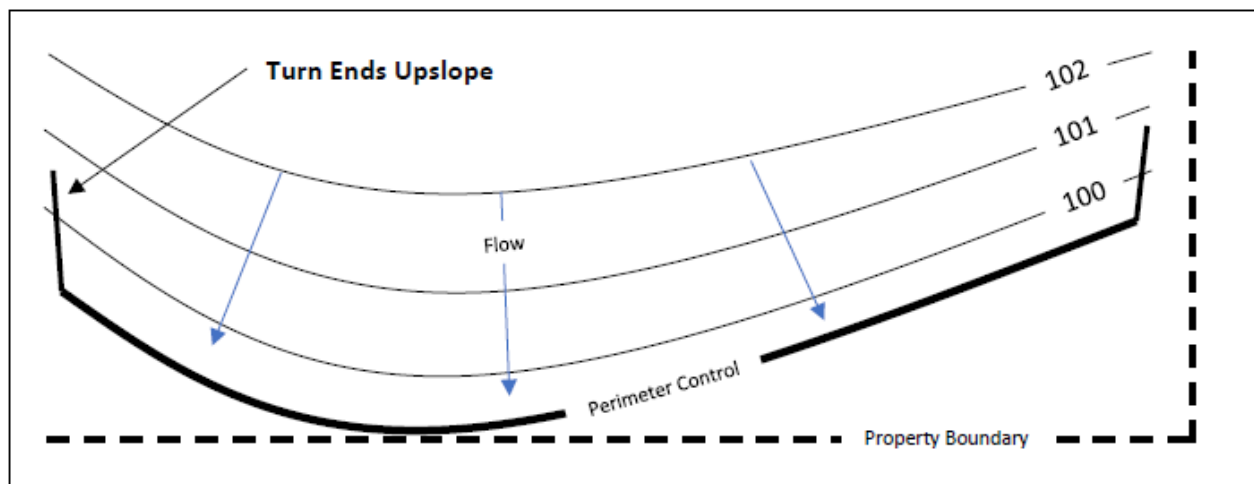
Log-Type Products: Sediment control products constructed of an outer sock of geotextile or other type of netting or permeable containment media surrounding an inner filtering media. Log-type products are commonly referred to as wattles or filter socks.

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.

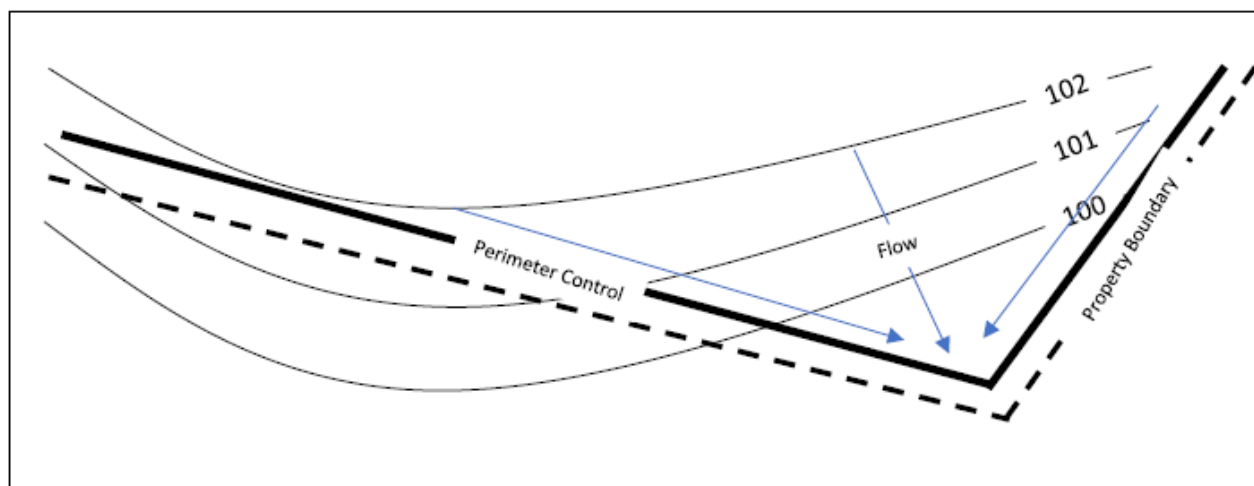
Small Holes: Holes that are less than 12 inches long and less than ½ inch wide located within the top 1/3rd of the log-type product.

**Figure 1:
Placement on Contour**



CORRECT PLACEMENT

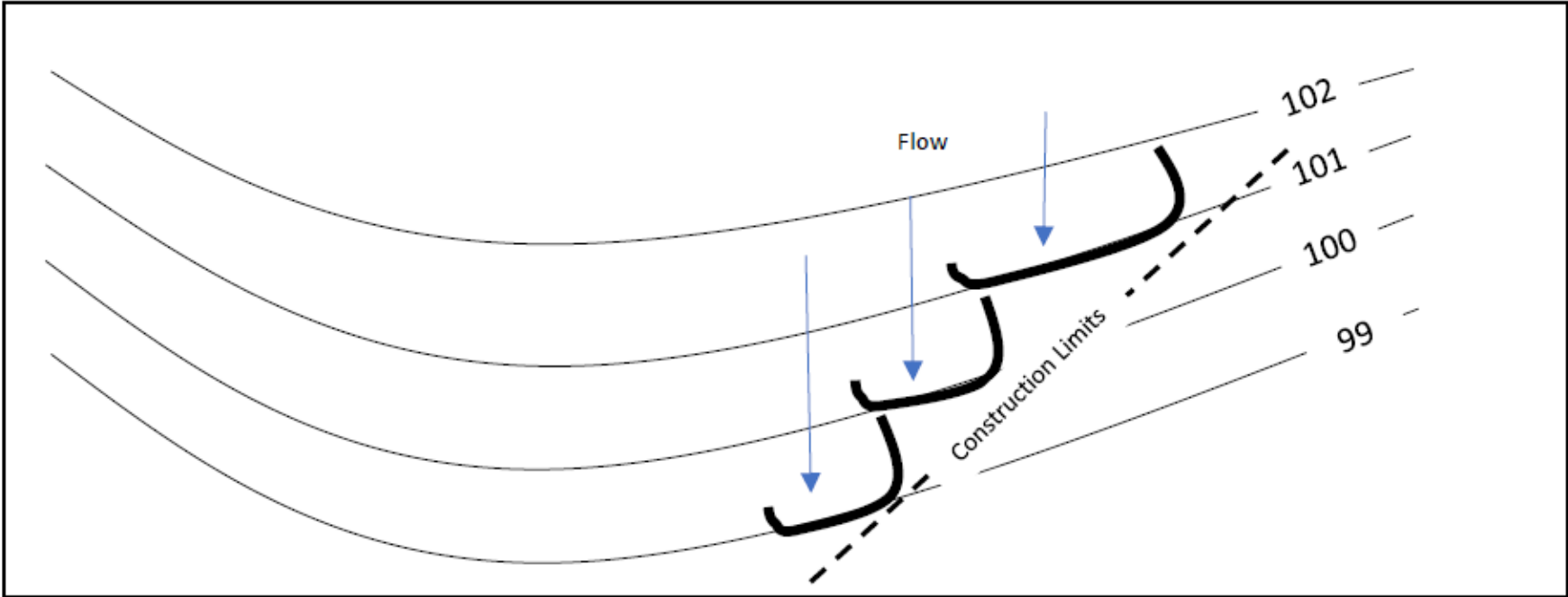
Install perimeter control on contour and turn the ends upslope. This will create the largest potential ponding area to maximize sediment removal efficiency.



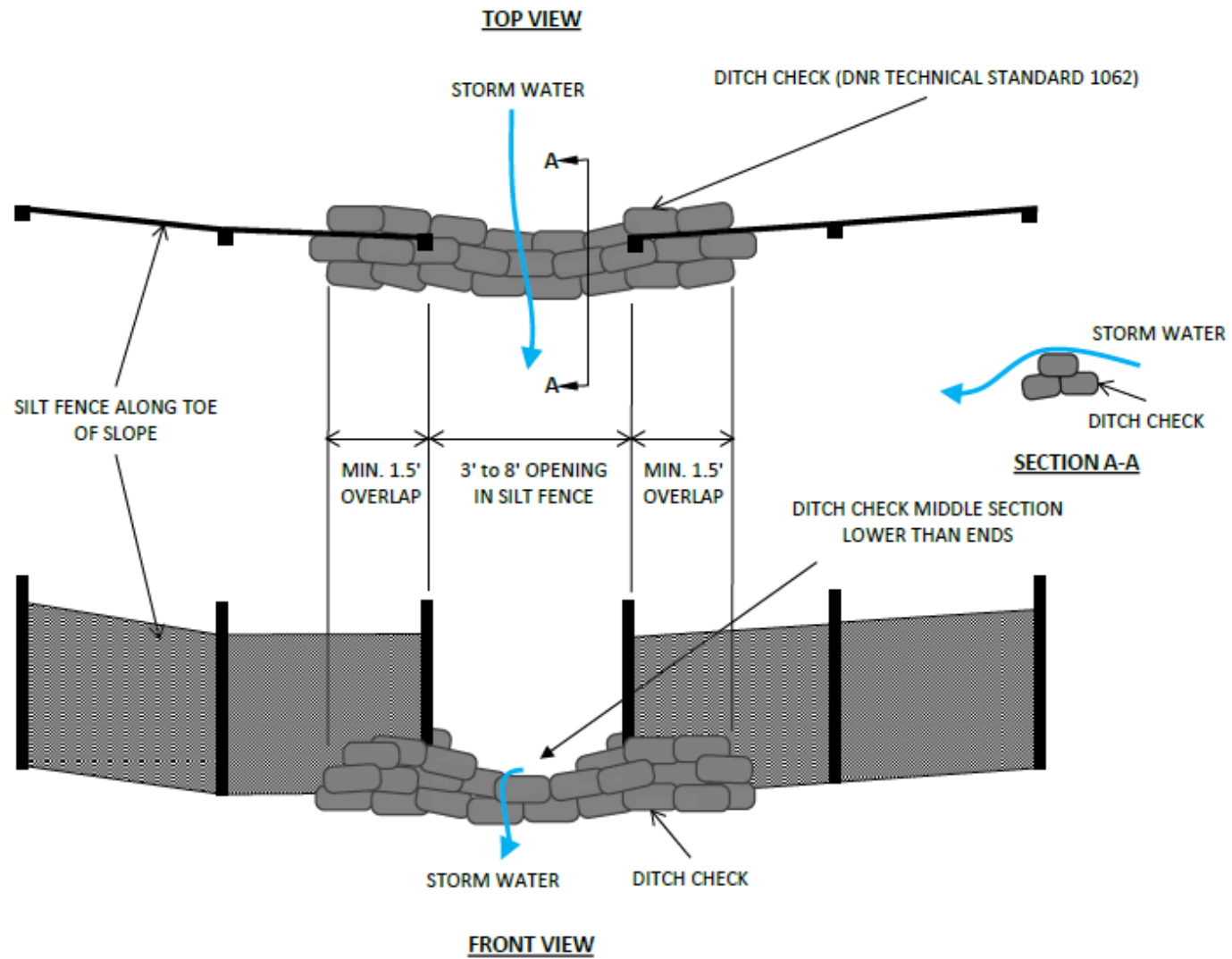
INCORRECT PLACEMENT

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.

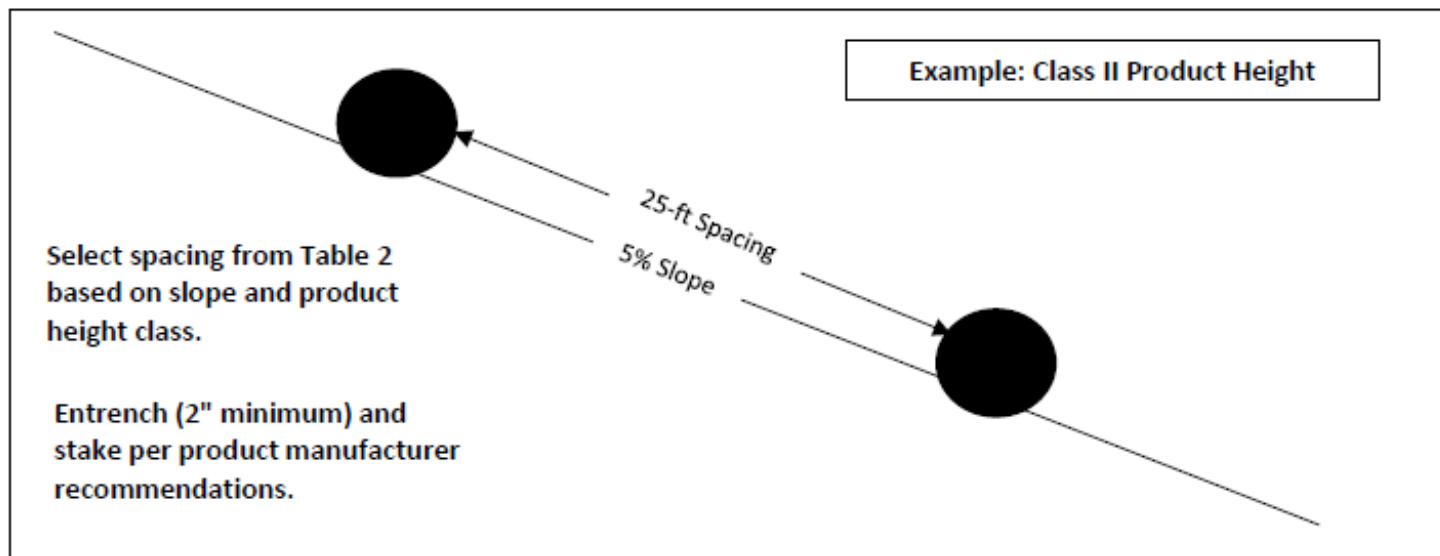
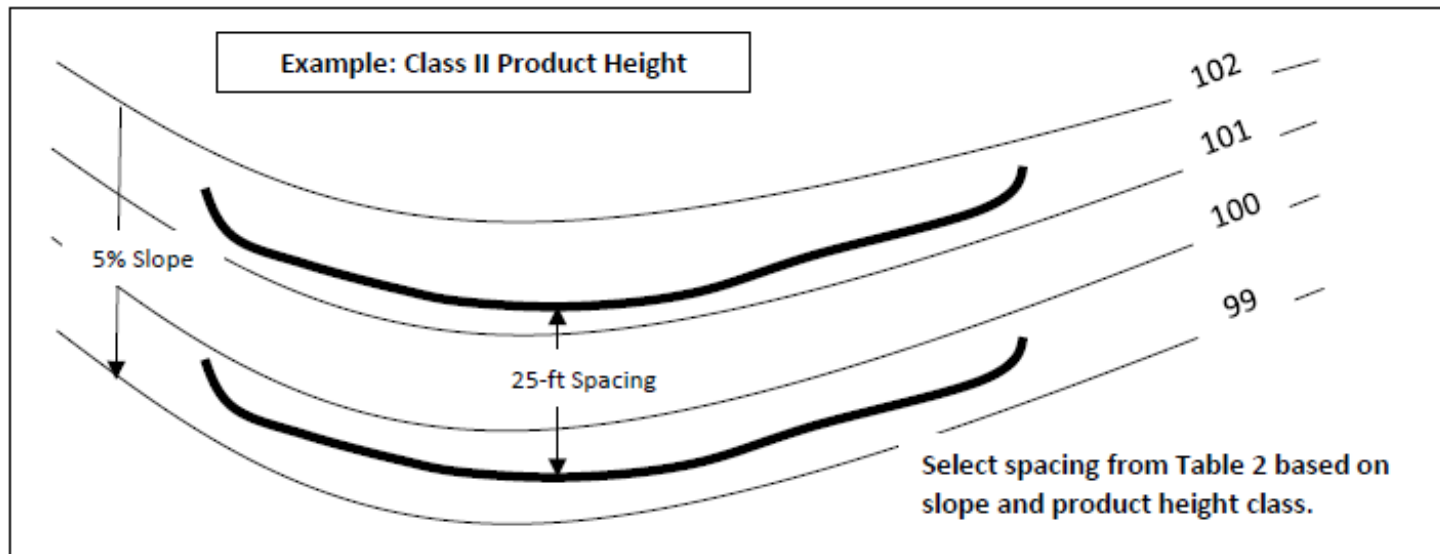
Figure 2:
J-Hooks



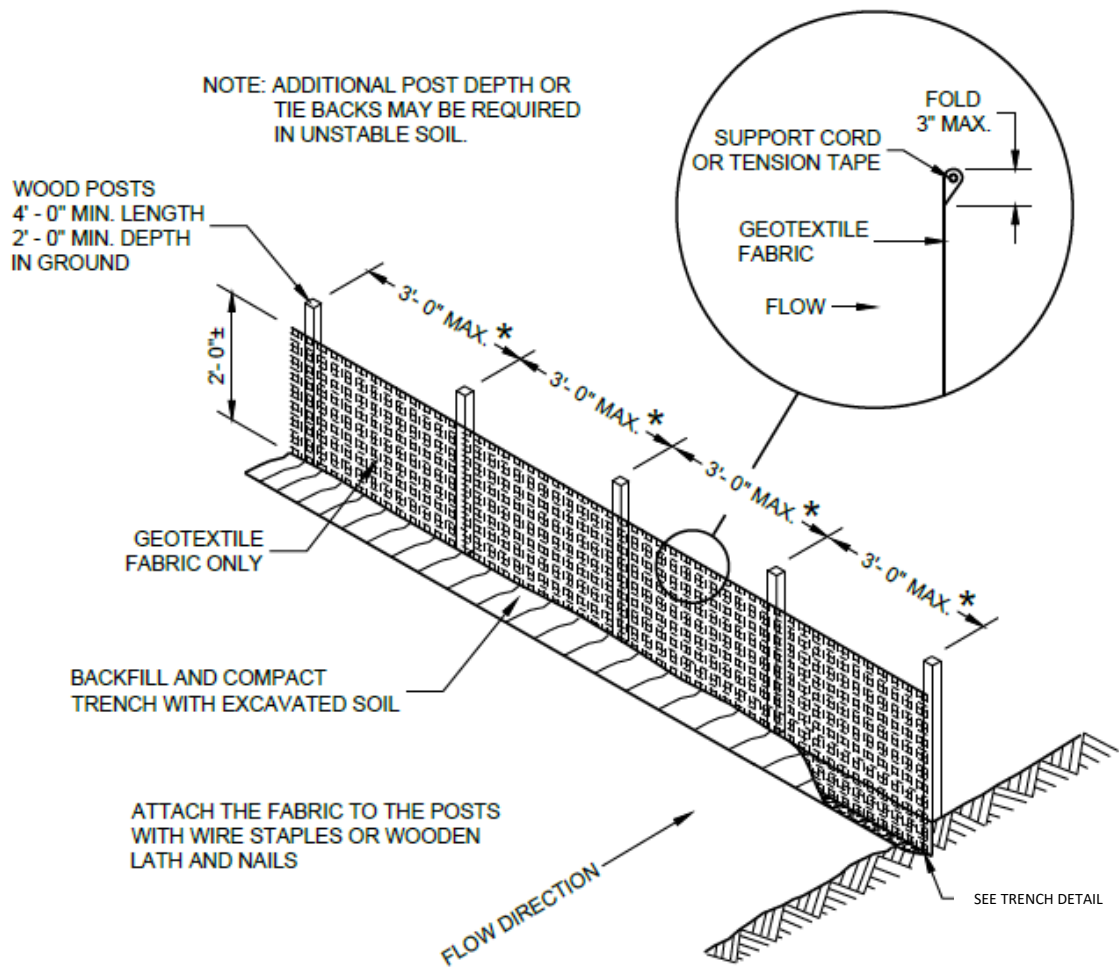
**Figure 3:
Silt Fence Relief**



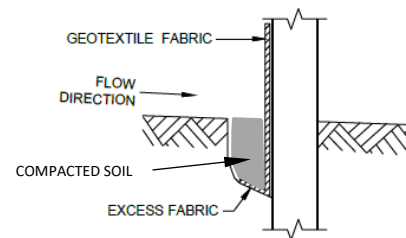
**Figure 4:
Slope Interruption**



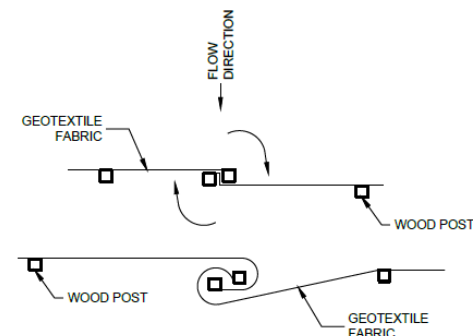
**Figure 5:
Silt Fence Installation**



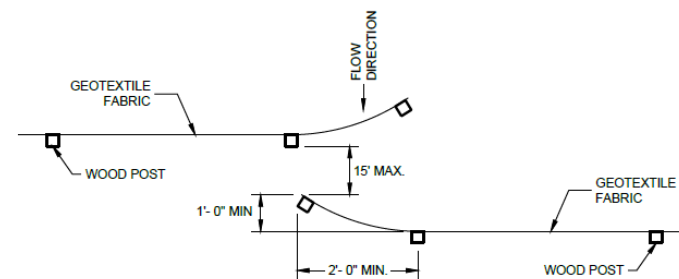
* NOTE: 8' - 0" SPACING ALLOWED IF A WOVEN GEOTEXTILE FABRIC IS USED.



TRENCH DETAIL



TWIST METHOD



HOOK METHOD

JOINING TWO LENGTHS OF SILT FENCE