

## Description

Geotextiles are flexible, textile-like fabrics of controlled permeability used to provide filtration, separation, reinforcement, drainage functions and soil stability. Geotextiles prevent or reduce the discharge of sediment as a result of construction activity by stabilizing soil using a wide variety of geotextile materials and applications. Areas with current and potential erosion problems may also benefit from the installation of geotextiles. Geotextiles may also be used in conjunction with other construction methods or as part of a landscaped terrain to prevent potential erosion problems. This practice will create a significant reduction in sediment.

## Selection Criteria

The following applications are suitable for geotextiles:

- Areas where disturbed soils must be stabilized on a construction project, for which erosion control matting, hydraulic mulch and other methods are not appropriate.
- Slopes steeper than 2:1 (H:V), or where the erosion hazard is high.
- Critical areas, such as streams, wetlands, or other highly valued resources needing protection.
- Channels intended to be vegetated or otherwise lined where the design flow exceeds the permissible velocity.

There are many types of geotextiles; selection of the appropriate type should be based on the desired need and site conditions. The following criteria should be considered in selecting a geotextile:

- Effectiveness (reducing erosion, slowing flow velocity, retaining soils)
- Engineering properties (strength, texture, weight, opening size)
- Acceptability (no environmental impacts, regulatory approval, aesthetics)
- Function (vegetation enhancement, safety, affect on wildlife)
- Maintenance (longevity, repair or replacement methods, inspection schedule)

## Design Considerations

Proper site preparation is essential to ensure complete contact of a geotextile with the subgrade. Grade and shape the installation area. Remove loose rocks, clods, vegetation or other obstructions.

Prepare subgrade by loosening at least 2 inches of topsoil. Incorporate topsoil amendments as necessary, such as compost, lime, and fertilizer, according to soil tests, vegetation plan, and manufacturer's recommendations.

Field joining may be accomplished by overlapping and then using stakes or staples in the overlapped portions or sewing for critical applications. The amount of overlap depends on the size and positioning of the stakes or staples.

Care should be taken to anchor edges (particularly on the up-slope side) and overlap joining sections to ensure adequate protection. Follow manufacturer's instructions.

Consult manufacturer's written guidelines for specific product installation procedures.

Geotextiles, which are to be placed permanently on long slopes or steep grades, must be selected and designed by a registered engineer with appropriate experience and knowledge. Slope stability and slope failure analyses may be necessary to ensure that a geotextile will not be a potential problem, particularly in areas that could endanger people or property. Placing geotextile under a layer of soil generally creates a potential slope failure plane, which could be mitigated by terraces or structural measures.

Install the geotextile in anchor trench at least 6 inches deep and 6 inches wide at the uphill location, or at the downstream location if in a channel. Backfill anchor trench and tamp earth firmly.

Unroll blanket down the slope or in the upstream direction of water flow. Lay blankets loosely and maintain direct contact with the subgrade soil. Do not stretch or twist geotextile fabric. Overlap edges of adjacent parallel rolls by at least 3 inches and then stake or staple within the overlap.

When blankets must be spliced, place blankets end over end (shingle style) with a minimum overlap of 6 inches. Install stakes or staples through overlapped area approximately 12 inches apart.

Stake or staple geotextiles as recommended by the manufacturer for the specific application. Stagger stakes or staples rather than installing in a straight line. Use biodegradable materials whenever possible. Place initial lift of material carefully onto geotextile; avoid damage from heavy equipment blades, buckets or tracks.

## Maintenance

Installation of geotextiles shall be inspected after significant rainfalls to check for erosion and undermining. If washout or breakages occur, repair or replace geotextile immediately after repairing the damage to the slope or channel.

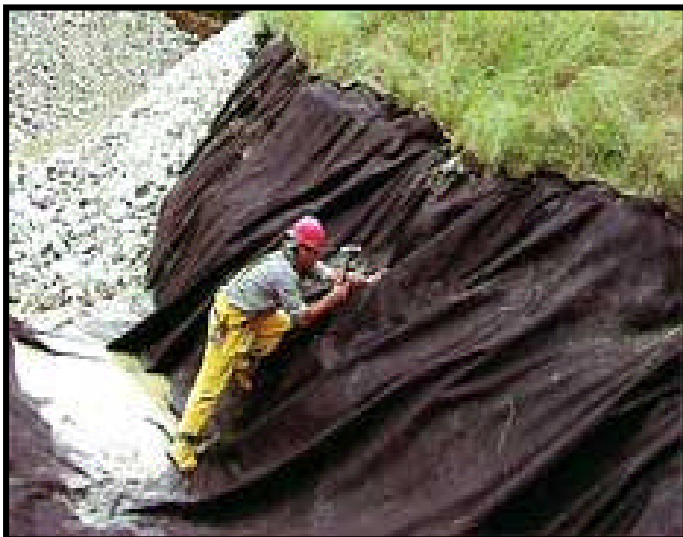
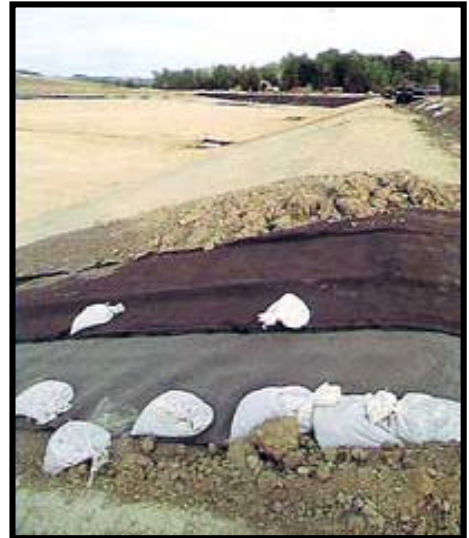
Inspect fiber rolls whenever rain is forecast and perform required maintenance. Inspect fiber rolls following rainfall events and at least daily during prolonged rainfall. Repair or replace fiber rolls that are torn or unraveling.

## Limitations

Some slopes or channels may be difficult for heavy equipment to access, requiring substantial effort such as excavation and filling. Consider access needs early in the design phase and incorporate into design plans.

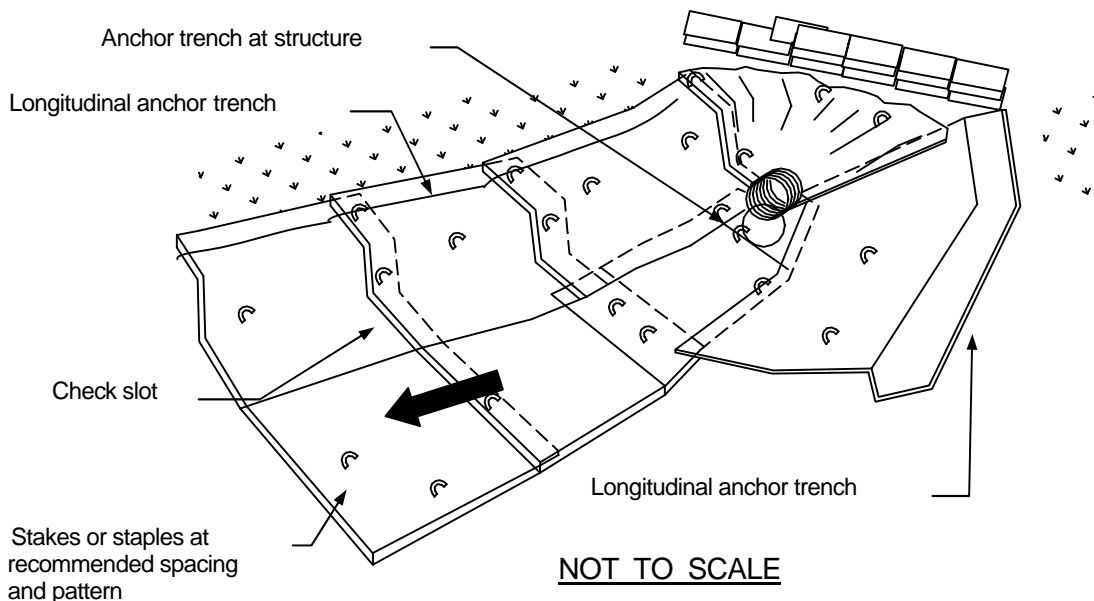
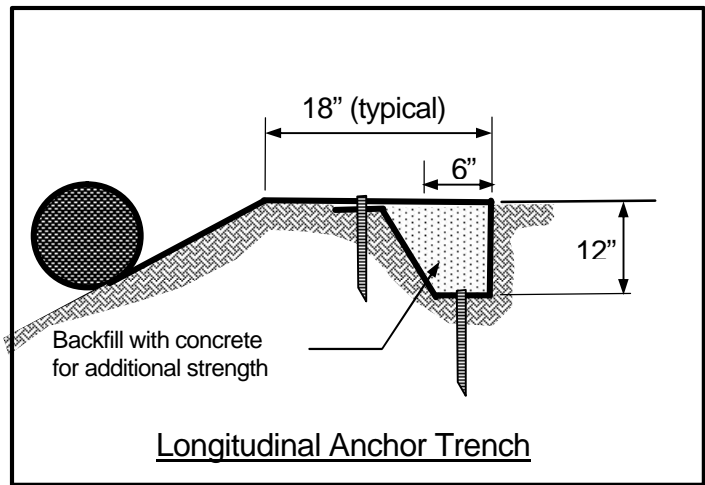
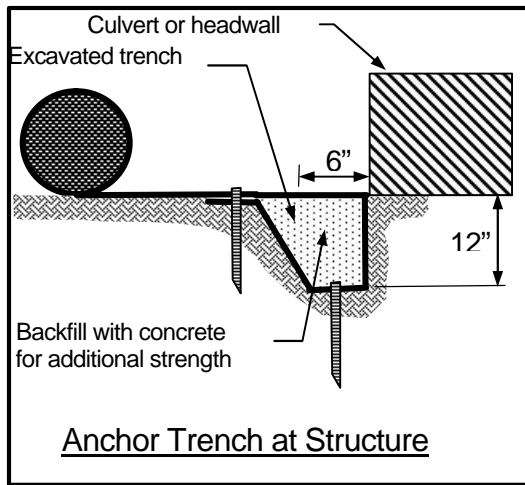
Geotextiles may not be suitable in areas where vegetation will be mowed regularly (since stakes and netting can catch in mowers and other equipment).

Photos 1 - 4  
Geotextiles in Various Applications

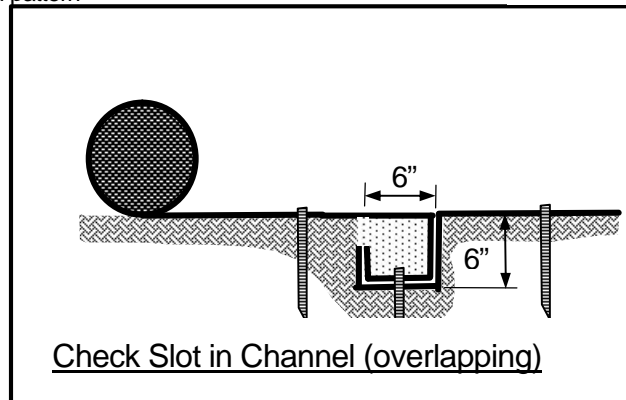


**Geotextile mats not only protect ground surfaces from wind and stormwater erosion but also allow vegetative growth (Source: Rolanka International, 2000)**

Figure 1  
Anchoring Geotextiles in Trench



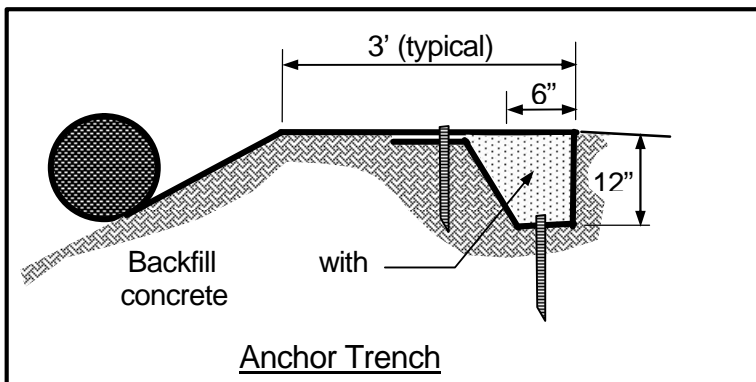
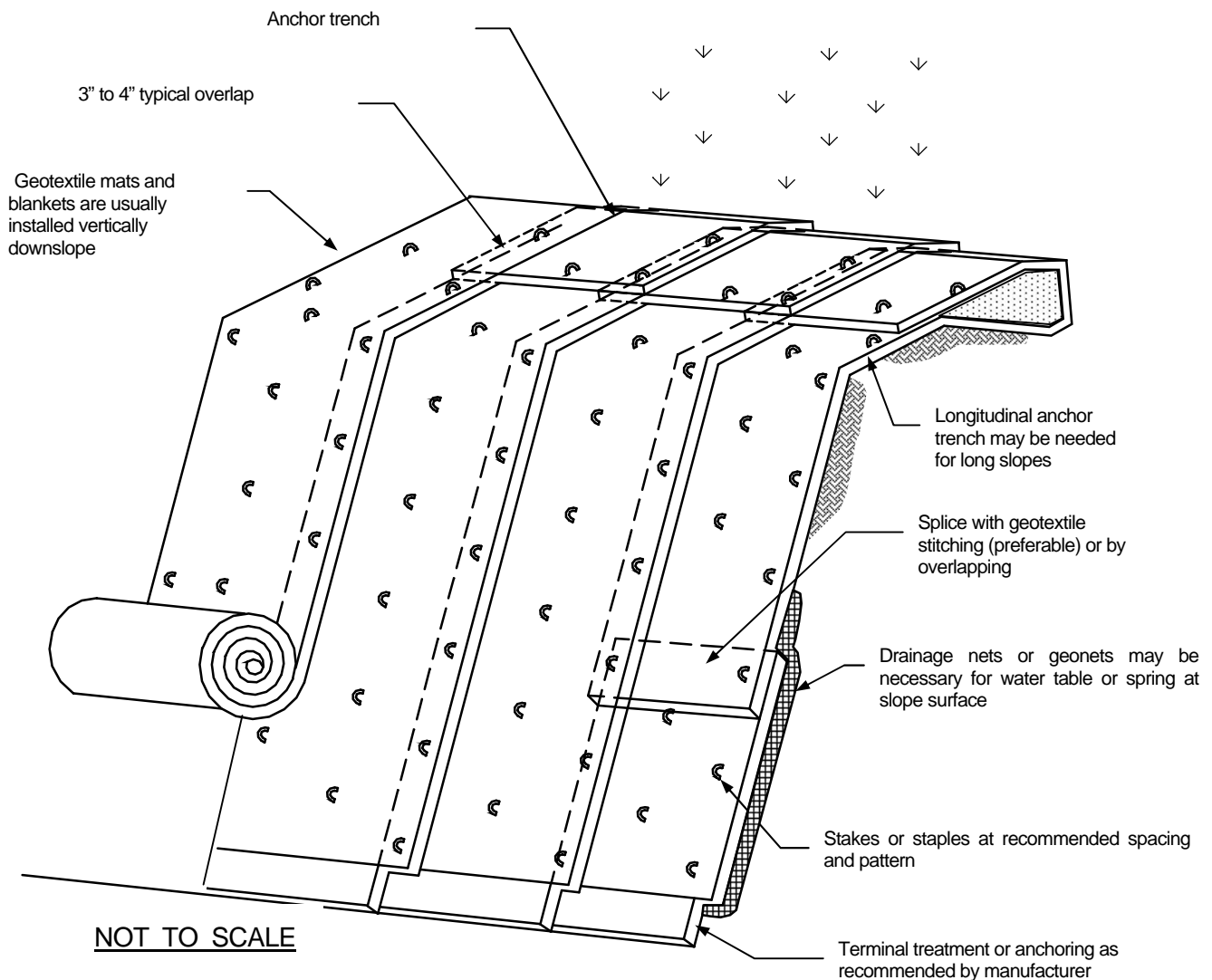
Stakes or staples at recommended spacing and pattern



Notes:

1. Stitching geotextile seams is preferable to joints by overlapping. Consult a registered engineer for hydraulic and stability analyses for flowing streams and for steep grades.
2. Staking or stapling layout shall conform to manufacturer's recommendations for flow and grades.

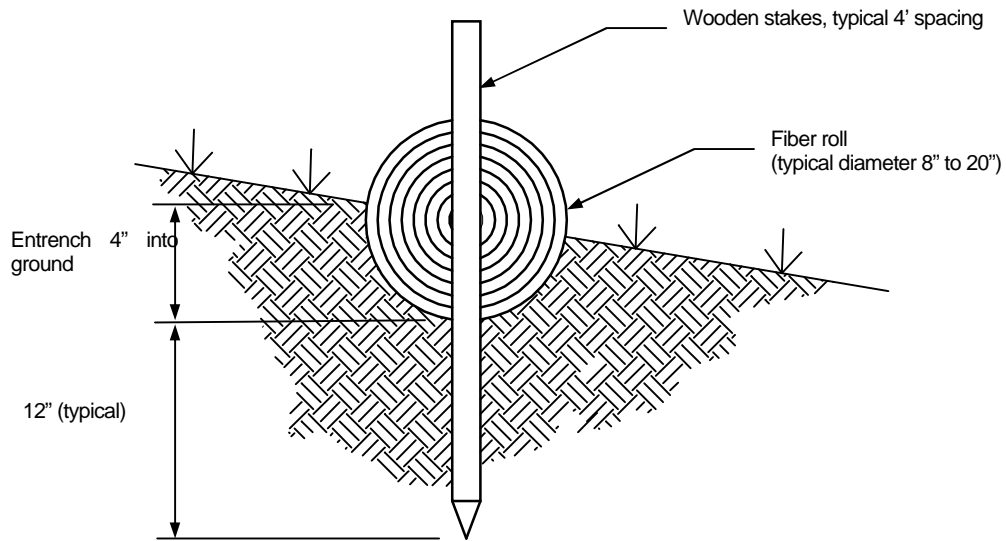
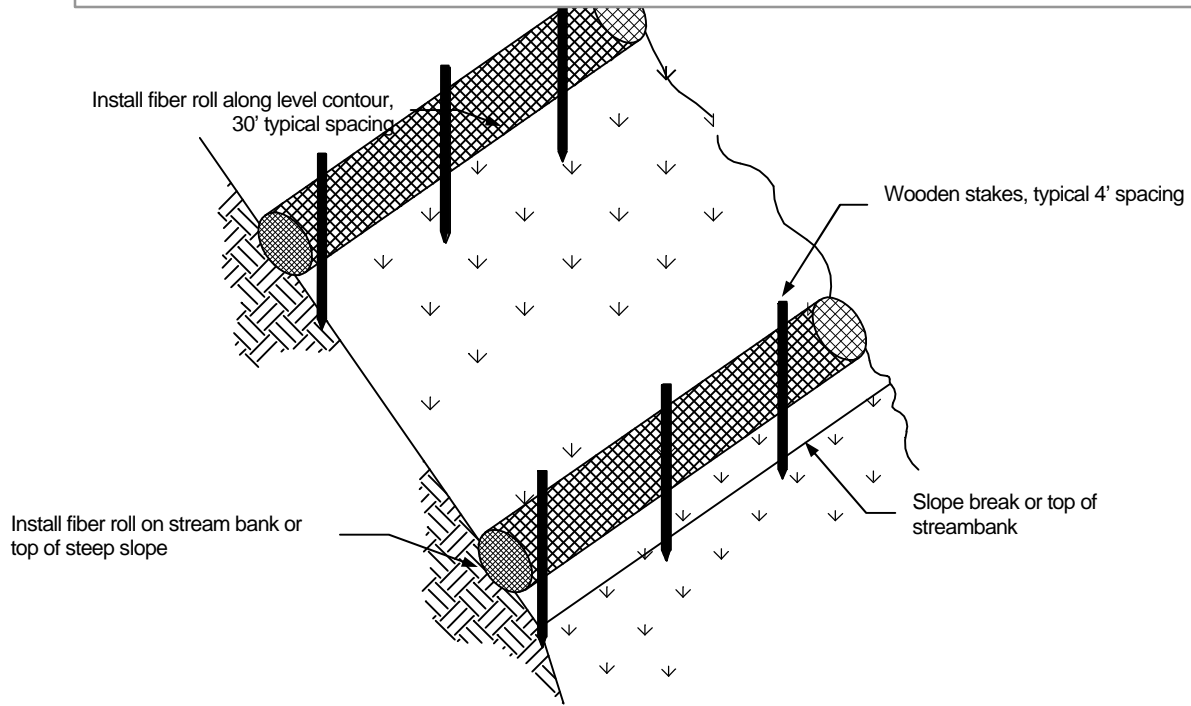
Figure 2  
Anchoring Geotextiles on Embankments



**Notes:**

1. Stitching geotextile seams is preferable to joints by overlapping. Consult a registered engineer for stability analysis of long grades or grades steeper than 3:1.
2. Staking or stapling layout shall conform to manufacturer's recommendations for flow and grades.

Figure 3  
Fiber Roll Installation



NOT TO SCALE

References: Knoxville (City of). October 2007. Knoxville Stormwater Engineering Division. City of Knoxville BMP Manual. [http://www.ci.knoxville.tn.us/engineering/bmp manual/](http://www.ci.knoxville.tn.us/engineering/bmp%20manual/)  
<http://www.swicofil.com/>