

Using Geotextiles on Unpaved Low Volume Roads



Geotextiles help to stabilize roads with inadequate road bases

Excessive water in a roadbed is the most common cause of rutting on rural roads. A poor or insufficient base increases problems caused by water. Geotextiles can increase the stability of weak subgrades and the load bearing capacity.

Water in the roadbed is commonly caused by underground springs in or near the roadbed, a high water table, or low areas where surrounding fields are higher than the roadway and there is no place to divert the water.

The problem may be persistent, such as ground seepage or intermittent due to flooding. Improving drainage is ideal but not always achievable.

The Functions of Geotextiles

There are three primary functions of geotextiles on unpaved roads:

1. Geotextiles provide separation. Without them, the aggregate and weak subgrade materials mix and the loaded aggregate base materials are forced into the subgrade. Mixing causes a reduction of load bearing capacity and accelerated rutting. Geotextiles allow water to pass through the layers while preventing the materials from mixing.
2. A geotextile provides filtration and increased drainage capacity in wet or saturated soils. Under load, high pressure creates a slurry that “pumps” upwards against the fabric. The fabric acts as a filter, screening out fines. It prevents contamination of the aggregate layer and allows water to freely drain. Filtration allows water to pass through the fabric while preventing soil migration. Evaporation from the underlying soil

can occur which prevents water pockets from developing and hydrostatic pressure due to rapid or repeated loads.

3. Drainage is critical to structural performance. Water must be able to pass through the fabric. Geotextiles allow rapid water drainage. Maintaining the drainage in the base and subgrade is important to prevent system failure.

Benefits of Using Geotextiles

- Reduced maintenance cost
- Reduction of the depth of the structural section required to carry the load.
- Reduced initial construction costs.
- Structural section life is prolonged and maintenance costs reduced due to the fact soils are not intermixing.

Woven vs Nonwoven Geotextiles

There are two types of fabrics: woven and nonwoven.

Woven can withstand higher stress and strain than nonwoven fabrics. However, woven fabrics have lower abrasion resistance, less permeability, and poorer surface structure friction than nonwoven fabrics.

Nonwoven fabrics allow water to pass through them and are recommended for most unpaved roads. They offer superior resistance to abrasion and provide good characteristics for separation and filtration/drainage. Under load, they develop a high tensile strength and have good friction properties. This makes them a good choice for reinforcement.

Site Preparation

Clear and grade the area. Remove sharp objects. Cut trees and shrubs flush with the subgrade. It is unnecessary to remove top soil and vegetation. Excavate soft spots, backfill, and compact, so filled sections provide equal stability with adjacent areas. Grade the surface and cross slope shape to provide good drainage. Tight blading provides a smooth sur-



*Left:
Fabric is unrolled
in the direction of
construction traffic.
Fabrics overlap in the
direction of subbase
placement.*

face to support the fabric and a well-established crown.

Unroll the fabric in the direction of the construction traffic. Overlap in the direction of subbase placement. Overlap width is dependent upon the load bearing capacity of the subgrade, it varies from two to three feet.

Dump the aggregate on top of the fabric. Spread with a small loader. Avoid heavy traffic directly on the fabric. Spread the aggregate in the same direction as the geotextile. Overlap to avoid separation. Aggregate depth is determined by subgrade strength and anticipated wheel loading, usually four to six inches. Compact the aggregate using a roller. Vibratory compaction is not recommended.

Geotextiles Installation

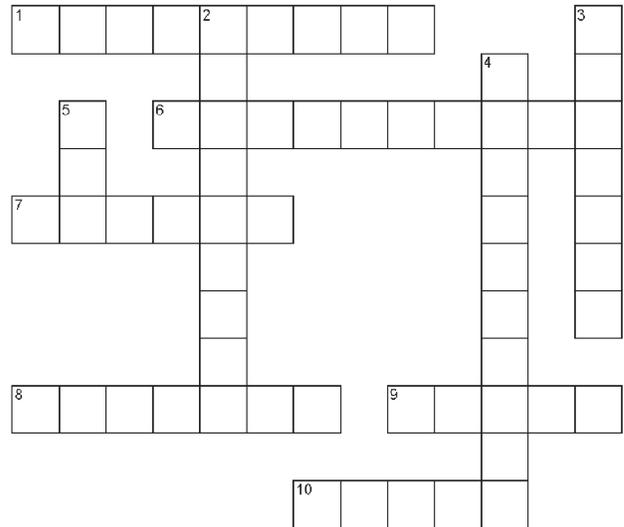
Proper installation is essential for good roadway stabilization. The aggregate overlay must be placed to its full depth and applied carefully as to not cause damage to the fabric by moving equipment.

Wrinkled or fabrics damaged during placement will not perform well. Repair fabric damaged during installation. Clear the damaged area plus three additional feet of all file material. Cover area with a geotextile patch extending three feet beyond the damage. Replace the material and compact.

Source:
The Link, Kentucky Transportation Center, Vol 21, No 4, p. 2-4.
Photos: John Hopkins, PENN DOT

Test your Knowledge

Items in this Newsletter



Across

1. "Generation Y"ers need supervision and _____
6. A passing vehicle should appear in a driver's _____ before leaving the outside mirror
7. "N" in TNC
8. This generation designation applies to people born between 1946-64
9. These spots are eliminated when side and rear-view mirrors are properly adjusted
10. There are 2 types of geotextiles, nonwoven and _____

Down

2. This zone must be considered when mowing for driver safety
3. Obstruction that fragments streams and rivers
4. A _____ plan is a budget-conscious method of meeting ADA requirements in a timely manner
5. _____ is a law designed to prevent discrimination based on physical handicaps.

See our website for solution.