

Overview

- The Answer
- Definitions
- Separation (between subgrade & base)
- Reinforcement (base strengthening)
- Filtration (between subgrade & base)
- Variables
- Performance

The Question

- If I use geosynthetic x, what will be my:
 - Reduction in base course? (BCR)
 - Increase in total vehicle passes? (TBR)

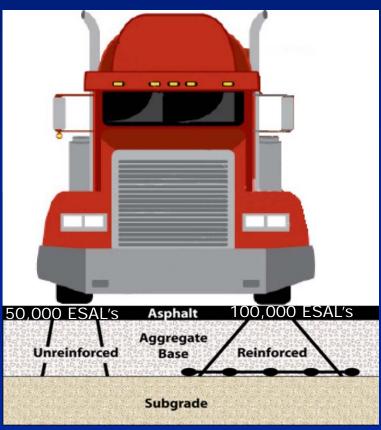
The Answer

It Depends

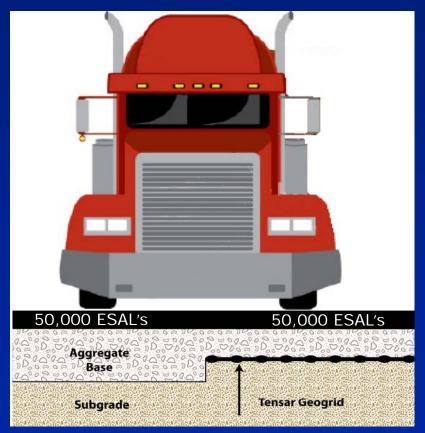
- Base Course Reduction (BCR)
 - Reduction in base layer thickness due to presence of geosynthetic
 - Same number of passes but with less base
- Traffic Benefit Ratio (TBR)
 - Ratio (for same section thickness) of:
 # of cycles of reinforced section to achieve a given rut depth
 # of cycles of unreinforced section to achieve same rut depth

TBR vs. BCR

Traffic Benefit Ratio



Base Course Reduction



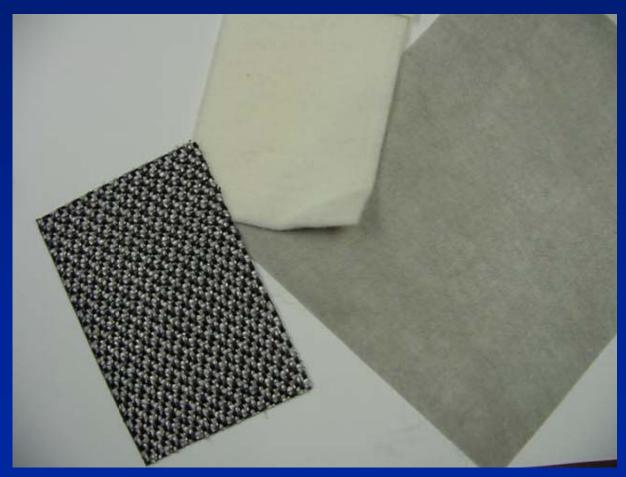


Types of Geosynthetics Typically Used in Roads



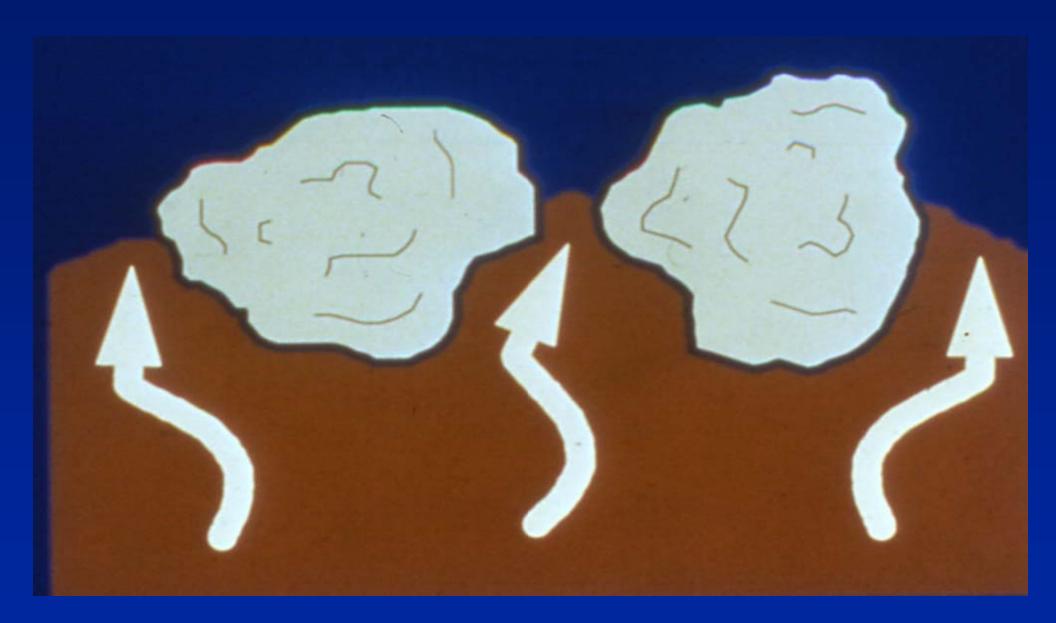
Definitions (con't)

■ Geotextiles

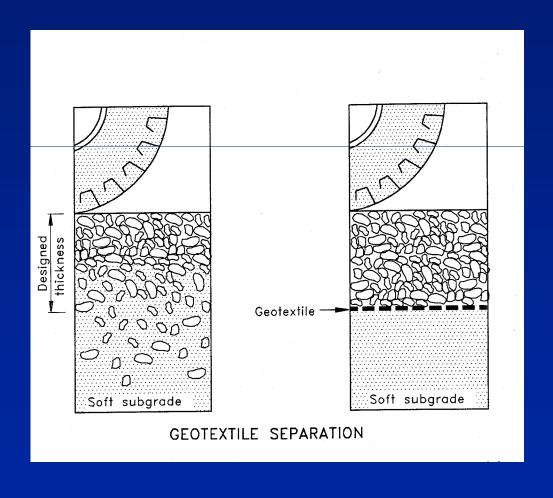


Functions of Our Geosynthetics

- Separation
 - Provides separation between two dissimilar materials
 - Prevents intermingling of soil layers that possess significantly different grain size distributions
 - Base course contamination
 - Allows free movement of water between layers
- Geotextiles



Separation



Separation

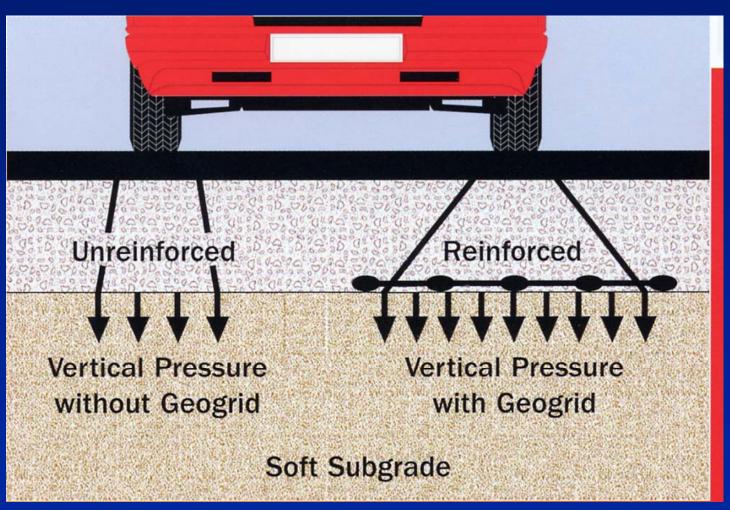




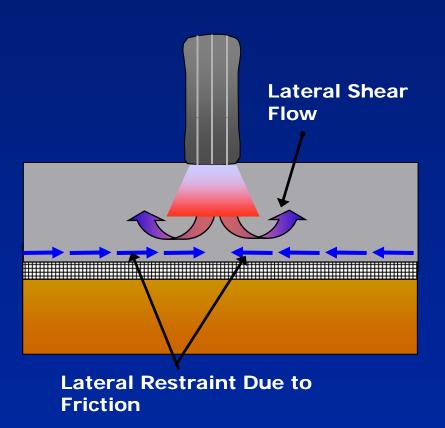


- Reinforcement
 - Adds tensile strength to soil
 - Embankments over soft soils
 - Construction of steep slopes & retaining walls
 - Reinforcement or stiffening of layers?
 - -Geosynthetics have no structural number
- Geogrids or geotextiles

Reinforcement or Stiffening?



Base Improvement

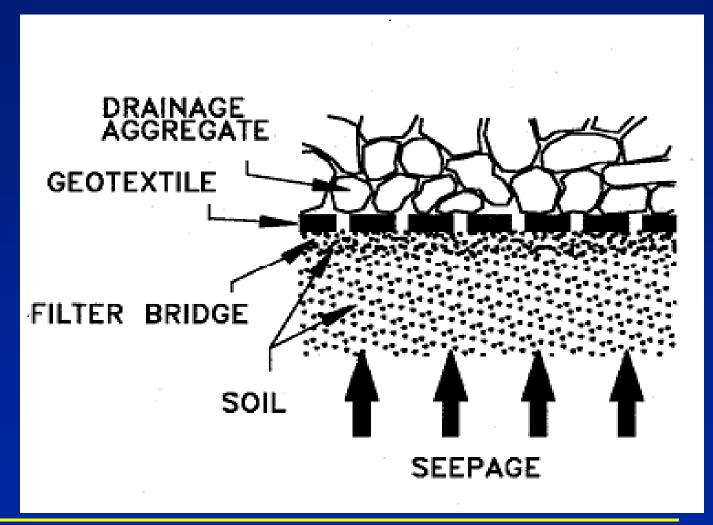


Lateral Restraint

- Confinement of the aggregate base during loading
- Results in increase in STIFFNESS of the base material
- Improved/reduced vertical stress distribution applied to pavement subgrade

- Filtration
 - Prevent soil migration
 - Prevent soil from migrating into base/drainage layer
 - Used below rip-rap/armor materials and in drainage systems
- Geotextiles

Filtration







Geosynthetic Functions Filtration



When May We Reduce Thickness?

When subgrades are soft and additional base must be added to stabilize subgrade



When To Use Geosynthetics

- When subgrade for separation/filtration:
 - Has a high percentage of fines
 - Is exposed to water for extended periods of time
 - Has the potential to migrate into the base

What Affects Base Reduction

- Subgrade strength
- Aggregate characteristics
- Design requirement
- Geosynthetic properties

Each case is project and product unique

Possible Values of Thickness Reduction & Traffic Benefit Ratio

- Base course reduction
 - For geotextiles (20-33%)
 - For geogrids (30-50%)
 - Minimum base thickness is 6"
- Traffic Benefit Ratio
 - For geotextiles (1.5 10)
 - For geogrids (1.5 70)

Final Points

- Geosynthetics, when properly installed using appropriate base materials, will always improve traffic benefit ratio
- Geosynthetics may allow for reduced base sections if properly designed
 - It will never make a low quality material better!

Questions?