UNIVERSITÀ DEGLI STUDI FIRENZE

Corso di Laurea in: SCIENZE E TECNOLOGIE DEI SISTEMI FORESTALI
Curriculum: PRODUZIONI LEGNOSE

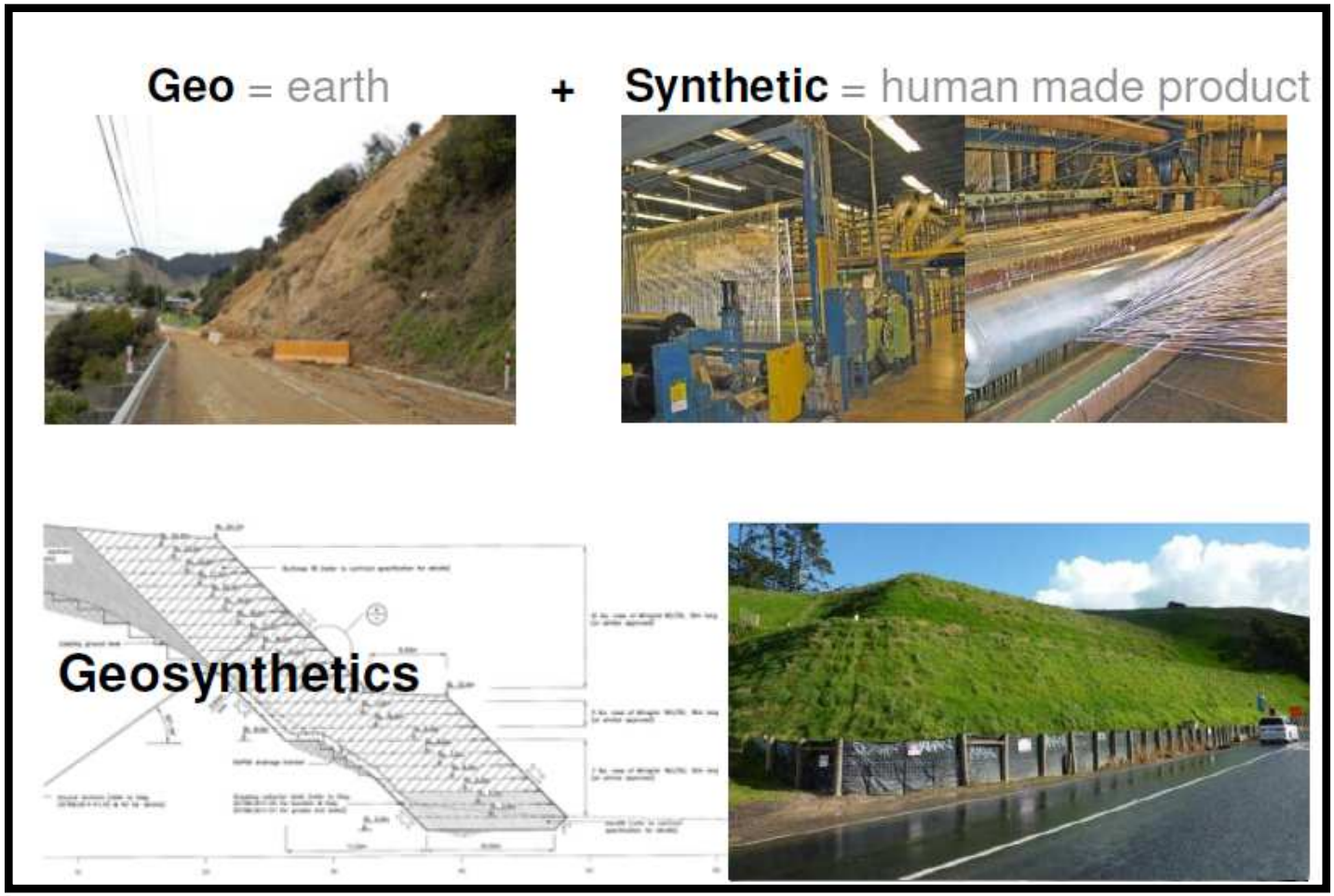
Pianificazione ed organizzazione tecnologica

Geosintetici

UNIVERSITÀ DEGLI STUDI FIRENZE
DAGRI
DIPARTIMENTO DI SCIENZE E TECNOLOGIE AGRARIE, ALIMENTARI, AMBIENTALI E FORESTALI

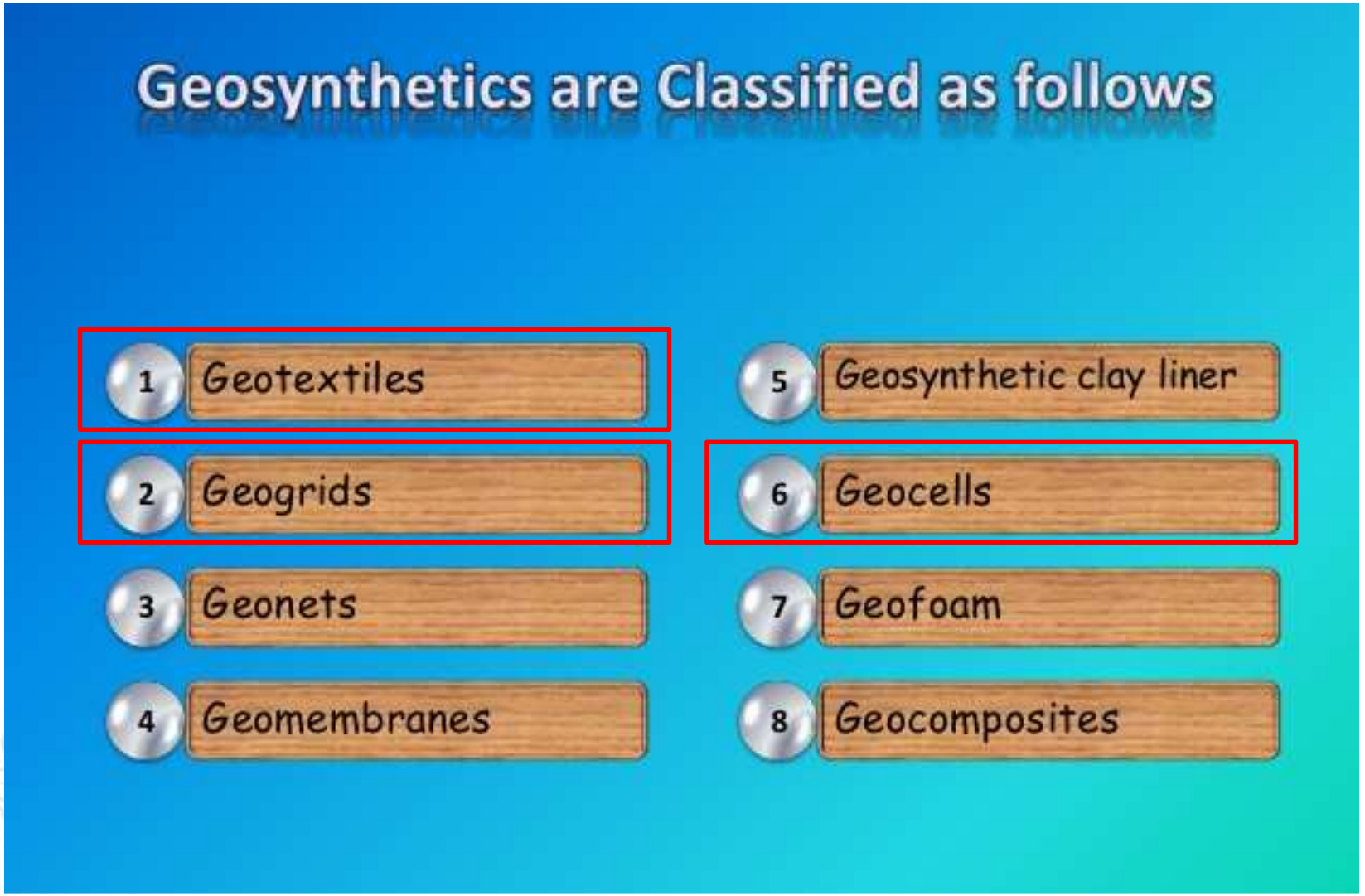
Enrico Marchi
enrico.marchi@unifi.it
055 275 5614

Introduzione

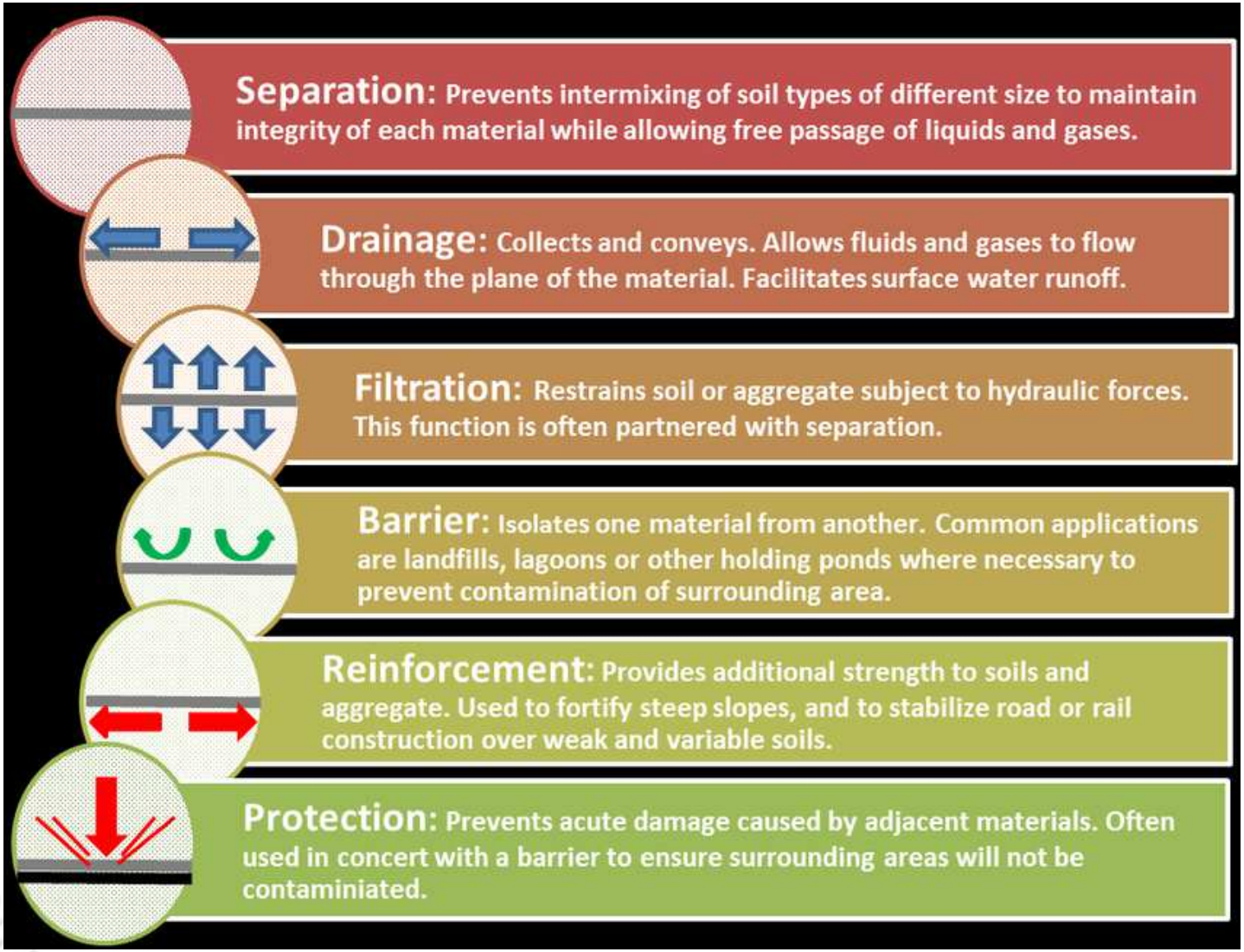


Geosynthetics: "(artificial) products/components that are skilfully added to earth (soil, rock, stone) as an integral part of a man-made project, structure, or system

Introduzione



Funzioni


Separation: Prevents intermixing of soil types of different size to maintain integrity of each material while allowing free passage of liquids and gases.
Drainage: Collects and conveys. Allows fluids and gases to flow through the plane of the material. Facilitates surface water runoff.
Filtration: Restrains soil or aggregate subject to hydraulic forces. This function is often partnered with separation.
Barrier: Isolates one material from another. Common applications are landfills, lagoons or other holding ponds where necessary to prevent contamination of surrounding area.
Reinforcement: Provides additional strength to soils and aggregate. Used to fortify steep slopes, and to stabilize road or rail construction over weak and variable soils.
Protection: Prevents acute damage caused by adjacent materials. Often used in concert with a barrier to ensure surrounding areas will not be contaminiated.

Geotessuti

Geotextiles are continuous sheets of woven, nonwoven, knitted or stitch-bonded fibres or yarns. The sheets are flexible and permeable and generally have the appearance of a fabric. Geotextiles are used for separation, filtration, drainage, reinforcement and erosion control applications.

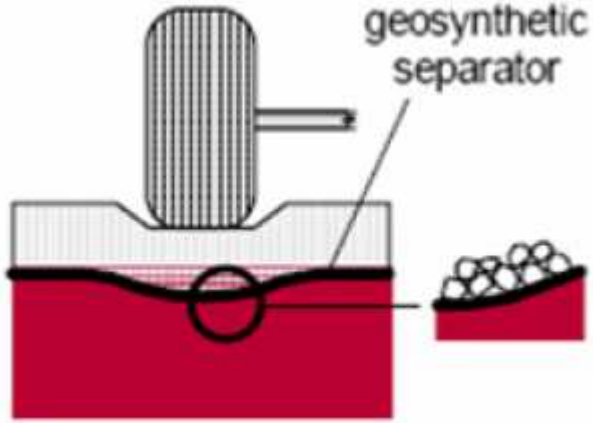
Geotextile: a strong synthetic fabric usually used in engineering construction projects that stabilizes loose soil and prevents erosion.

Geotessuti

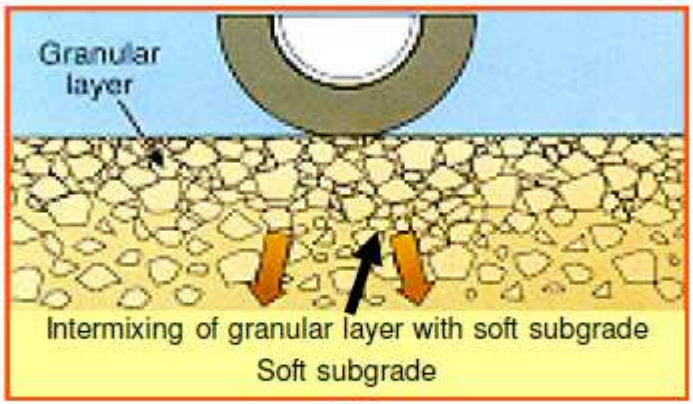
Geotextiles in forest road construction – main function:

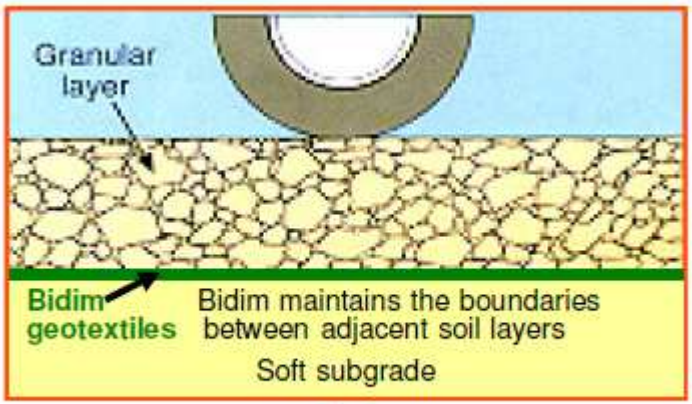
- **Separation** - layer between the road base materials (pavement) and the subgrade.
- **Filtration** - preventing that fine-grained material of subgrade is mixed with the granular road base.

Separate and filter two layers - giving “continuity” to the road base. This results in maintaining design thickness, but not enough for avoiding the risk of rutting (displacement).



Geotessuti

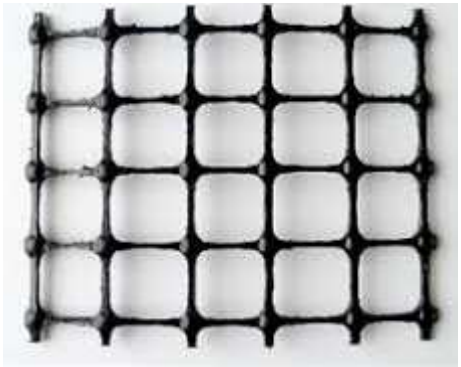

Granular layer
Intermixing of granular layer with soft subgrade
Soft subgrade


Granular layer
Bidim geotextiles
Bidim maintains the boundaries between adjacent soil layers
Soft subgrade

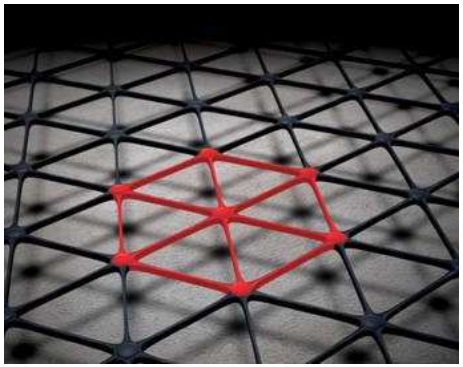
Geogriglie

Geogrids are geosynthetic materials that have an open grid-like appearance. The principal application for geogrids is the reinforcement of soil.

Uniaxial geogrids



Biaxial Geogrids

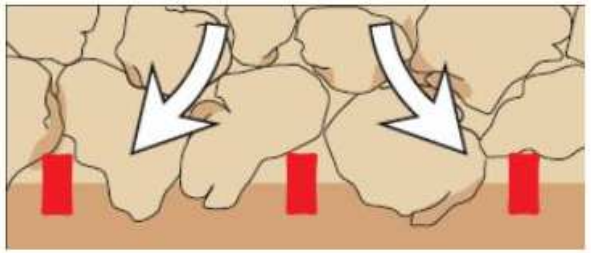


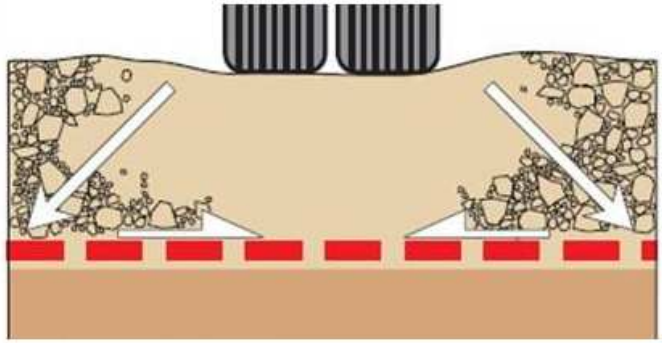
Triaxial Geogrids

Geogriglie

Main mechanism happening after Geogrid installation in pavement is the **reduction in lateral movement** of the aggregate.

Reduction of outward stresses means **inward stresses are formed**, which is the reason behind the increase in bearing capacity.

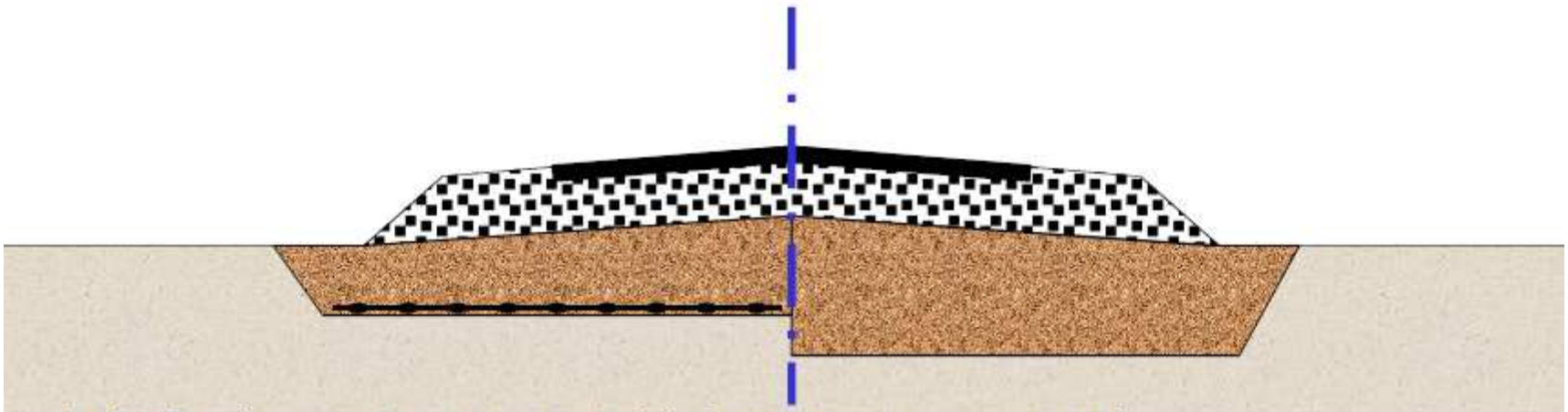




Geogriglie

Geogriglie

Why use geogrid reinforcement in a pavement ?



(1) Reduce pavement thickness & excavation

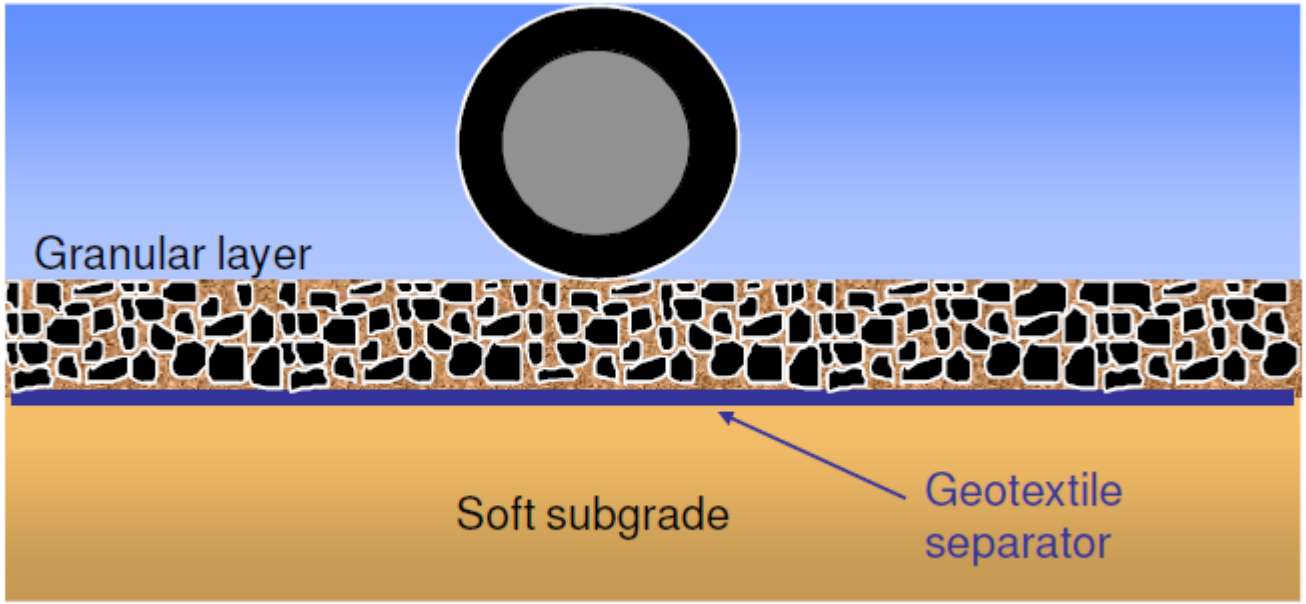
(2) Increase pavement life

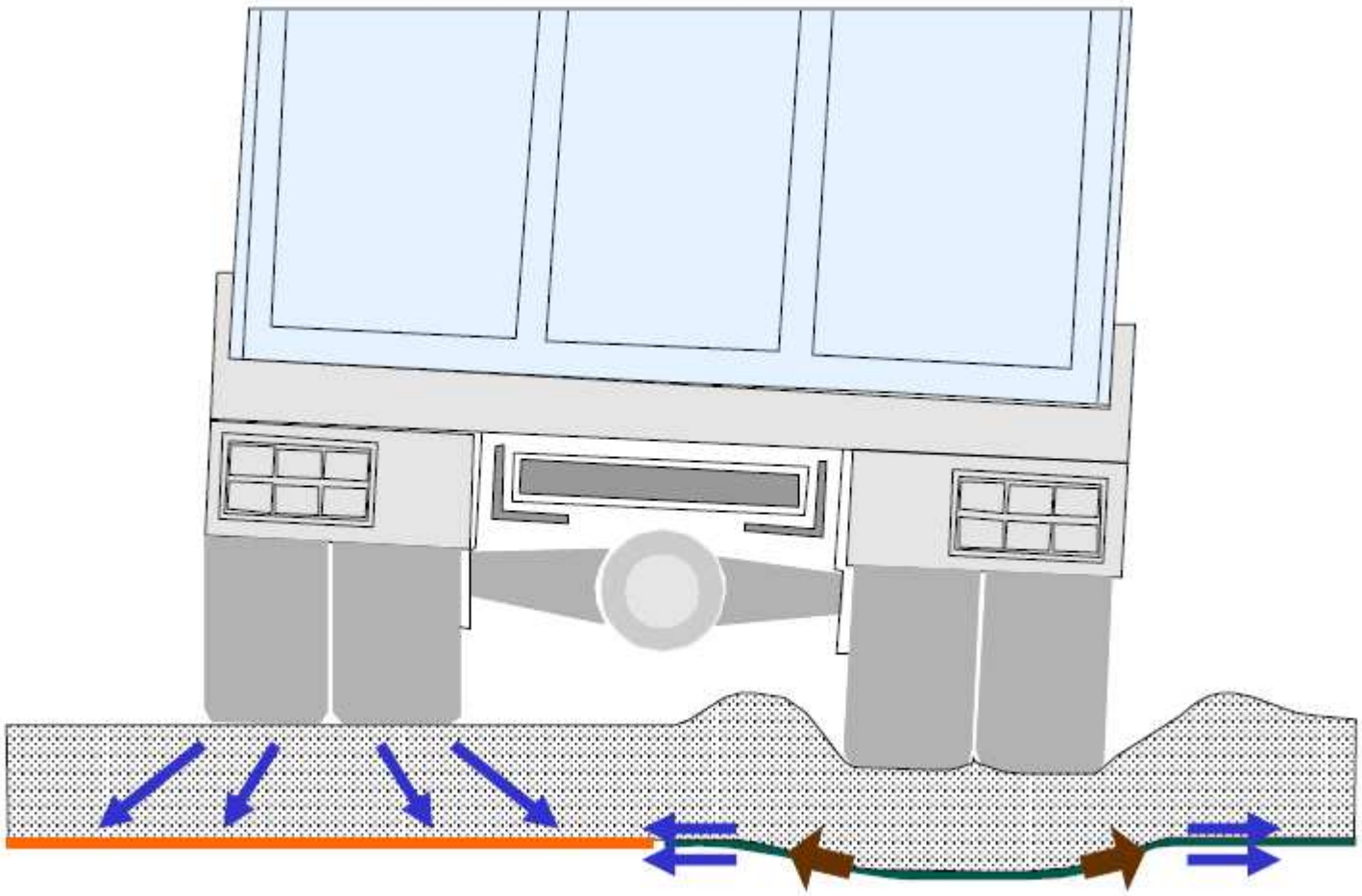
(3) Other benefits

Independent Specification

Geotextile Application
Separation

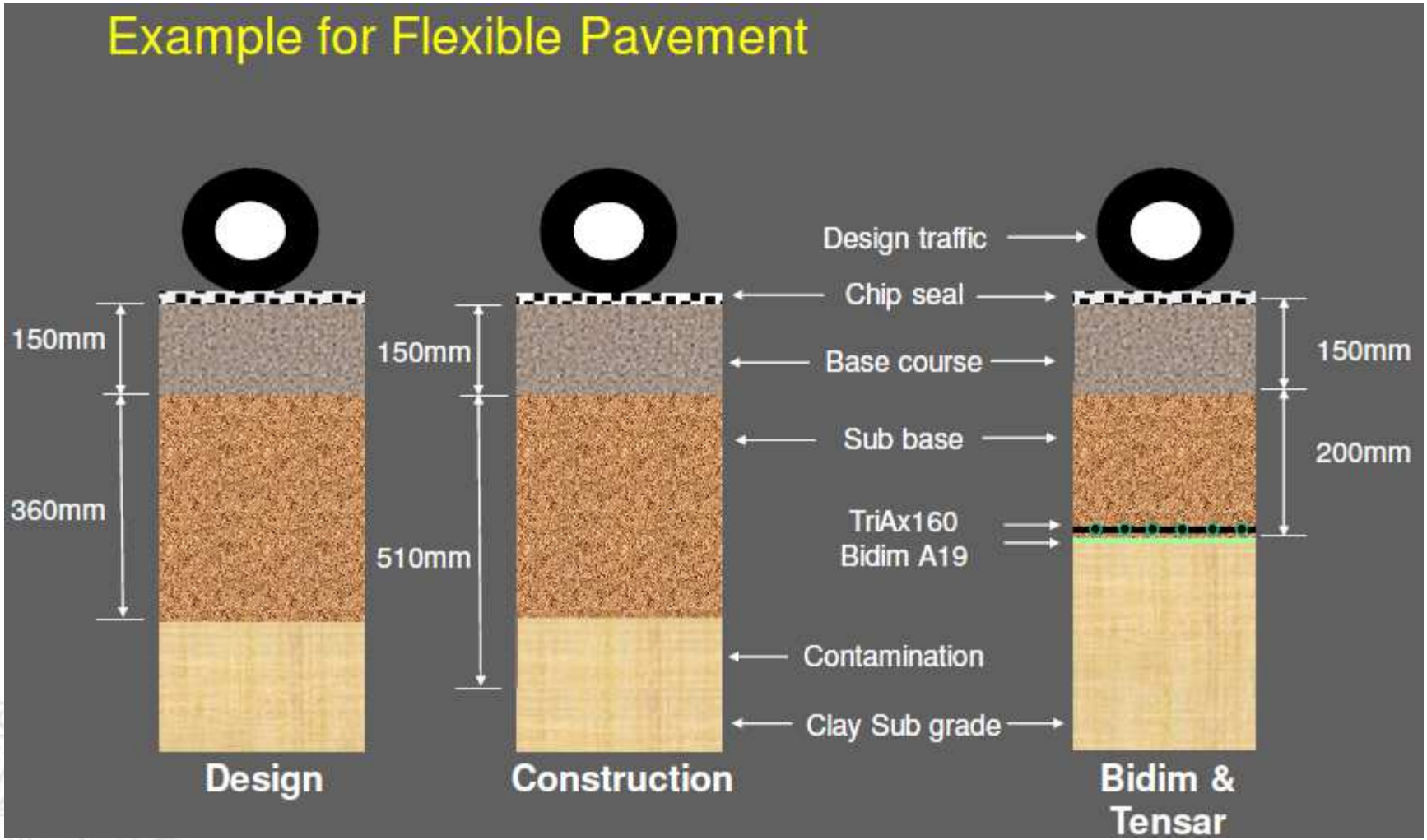
The use of geosynthetic material between two dissimilar materials to prevent the intermixing of materials





Tensar geogrid reinforcement

Geotextile


Example for Flexible Pavement
Design traffic
Chip seal
Base course
Sub base
TriAx160
Bidim A19
Contamination
Clay Sub grade
150mm
360mm
150mm
510mm
150mm
200mm
Design
Construction
Bidim &
Tensar

Geocelle

Geocells are relatively thick, three-dimensional interconnected single cells. They are produced joning together strips to form interconnected cells. They can be made of different types of polymers. The **geocells** are expanded at the **construction** site joined together and filled with soil. Single section dimension 4x6m – 5x10m

Geocelle

Also used for stream crossing:

- Stabilising soft ground
- Allows water to pass through
- Filled with gravel strong enough to drive the truck across

Geocelle