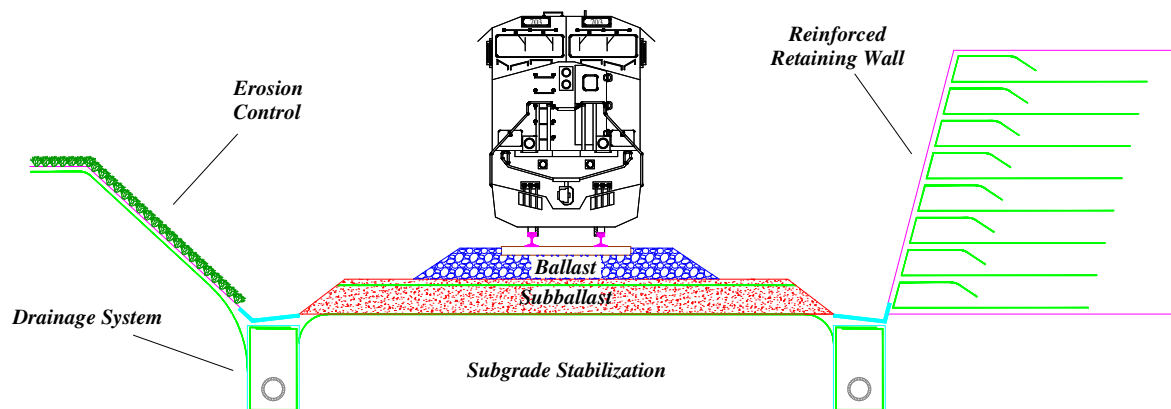




Geosynthetics in Railroads

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Geosynthetics may perform the following functions in new track construction or rehabilitation: separation of materials with different particle size distributions, filtration, drainage and soil reinforcement. In railroad construction, geosynthetics may be installed within or beneath the ballast or subballast layers.



Emphasis will be given here to the use of geosynthetics within and beneath ballast and/or subballast layers. Geosynthetics that are commonly used in this application are geotextiles, geogrids, geocomposites and geocells.

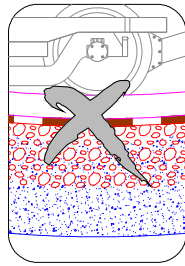


Before

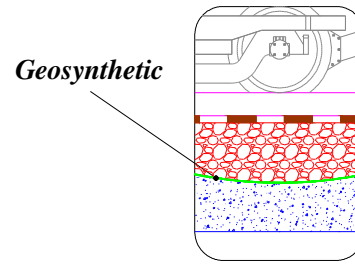


After

Separation: Geosynthetics (geotextiles) may be used to separate layers of the track support structure with different particle sizes and properties. The passage of trains on the rail causes movement of the track ties. As a result, fines from the subgrade may be pumped upward into the granular layers, reducing the strength and the drainage capacity of these layers. Furthermore, geosynthetics can reduce the penetration of granular particles into a soft subgrade, thereby maintaining the thickness and integrity of the granular layers and increasing track life time. To provide this function, the geosynthetic must be resistant to concentrated stresses (tear, puncture and burst) and have aperture sizes compatible with the particle sizes of the material to be retained.



Pumping



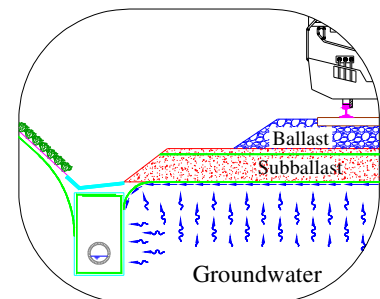
Separation

Reinforcement: Geosynthetics (geotextiles, geogrids and geocells) installed over unstable subgrades may eliminate the necessity to replace this soil, increasing the load bearing capacity of the system due to better stress distribution. When installed within the ballast or subballast layers, geosynthetics may help to reduce settlements associated with the lateral spreading of the ballast and subballast materials. The main geosynthetic characteristics that must be considered for this function are the interaction between geosynthetic-soil/ballast, resistance to mechanical damage, tensile stiffness modulus and tensile strength.



Filtration: The flow of water from the subgrade into the overlying granular layers may carry fines from the subgrade. This can occur because of the increase in stress levels in the subgrade due to the passage of trains. In this case, a geotextile can act as a filter, allowing the water to pass freely while the subgrade solid particles are retained. To fulfill this role, the geotextile must have adequate permeability and retention properties, and be resistant to clogging.

Drainage: Good drainage is critically important to avoid track deterioration due to the action of the water originating from precipitation onto the track or pumped from the subgrade into the ballast layers. A drainage geocomposite installed at relevant points in the track structure can provide cross-track drainage, preventing the accumulation of water. In this application the geocomposite must have adequate large discharge capacity and be resistant to mechanical damage.



If properly specified and installed, geosynthetics can improve the performance of railroads by increasing their life time and time between maintenance cycles.

About the IGS

The **International Geosynthetics Society (IGS)** is a non-profit organization dedicated to the scientific and engineering development of geotextiles, geomembranes, related products and associated technologies. The IGS promotes the dissemination of technical information on geosynthetics through a newsletter (IGS News) and through its two official journals (Geosynthetics International - www.geosynthetics-international.com and Geotextiles and Geomembranes - www.elsevier.com/locate/geotexmem). Additional information on the IGS and its activities can be obtained at www.geosyntheticsociety.org or contacting the IGS Secretariat at IGSsec@aol.com

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