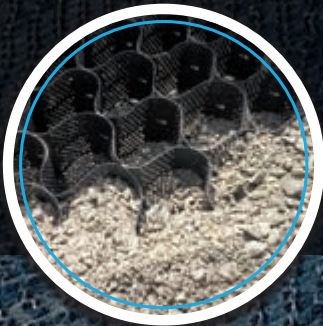




GEOSYSTEMS[®]
STRENGTH. FROM THE GROUND UP.
Since 1979

COMBAT RAILWAY EMBANKMENT PROBLEMS



GEOWEB[®] Geocells

Advanced Geosynthetic Technology

Presto Geosystems

Geocells Protect Railroads Against Potential Impacts of Climate Change

Throughout history, railroad companies have had to contend with every type of extreme weather event or geohazard imaginable.

In particular, flooding and major storms have cost the railroad industry billions of dollars in maintenance and repairs, and with the relative frequency of such events increasing, many railroad operators are taking proactive approaches to mitigate future risks. For steep embankments, or railroad right-of-ways (ROW) that are adjacent to steep slopes, selecting a suitable slope protection strategy can help mitigate geotechnical risks, particularly where such slopes may be susceptible to excessive erosion or landslides.

This article discusses how the GEOWEB® Geocells were integrated into a slope protection strategy for a rail line located in the Pacific Northwest (PNW) region of the US – an area where climate and soil conditions frequently converge to create the ‘perfect storm’ for rainfall-induced slope failures and shallow landslides. Whereas traditional erosion protection products such as erosion control blankets and turf reinforcement mats protect sloped surfaces long enough to establish vegetation, the GEOWEB® Slope Protection System offers a permanent erosion control strategy to stabilise the full depth of a vegetated soil or aggregate cover against sliding. Through an interconnected honeycomb-like network, the HDPE-based GEOWEB Geocells provide apparent cohesion and strength to infill materials that would otherwise be erodible or unstable on steep slopes.

Case Study: Protecting an Adjacent Railroad Line from Future Landslides

A record rainfall event created saturated soils, resulting in a major landslide near Castle Rock, Washington, on the railroad’s busy double-track mainline between Portland, Oregon, and Seattle, Washington. The landslide blocked heavy freight and passenger traffic for five days, resulting in costly downtime. Prior to this major shutdown, the site’s wet conditions caused smaller traffic-blocking slides, but due to the increased frequency of the landslides, the project owners, engineers, and contractors needed to find a viable solution to stabilising the embankments.



Project Challenges

The site challenges ruled out traditional erosion protection approaches, and it was determined an engineered solution was required in order to improve the slope's resistance to similar types of failures in the future.

The project engineering and construction crews had to overcome several hurdles, including:

- Saturated and highly erodible soils
- Challenging slope angles up to 60 degrees, with slope lengths of up to 100ft
- Difficult site access conditions due to adjacent private property lines, and proximity of the toe of slope relative to track location (less than 15ft)
- Active rail traffic: trains passed by the area every hour, resulting in frequent work stoppages in order to accommodate active rail traffic
- A short deadline to beat the rainy season – all slope repair work had to be completed within 45 days

Project Solution

After considering various slope repair options, the engineering team determined the GEOWEB® Geocell System with aggregate infill placed over a nonwoven geotextile

was most suitable as well as the most affordable long-term as it eliminated vegetation management costs associated with maintaining an area that is challenging to access and traverse with conventional mowing equipment. In addition to the cost savings, the rainwater flow down the slope within the aggregate-filled geocell structure reduced the rate at which the water flowed into the drainage system, thus avoiding the need to expand a nearby detention system.

The system comprises a 6in suspended veneer installed directly over the prepared slope surface. The geocell-reinforced layer was suspended using tendons, threaded through the GEOWEB section's i-slot panels and secured using a proprietary load transfer device, and anchored to a deadman at top of the slope. The load was transferred from the geocells to the tendons by tying the tendons to the patented ATRA® Tendon Clips.

The project engineer opted to place the GEOWEB Geocells on top of a non-woven geotextile for separation and filtration, and to further protect underlying soils against erosion and rilling.

After the GEOWEB system was installed, landslides halted and maintenance costs subsided. The GEOWEB System was the optimal solution to repair the susceptible railway ROW embankments.

Industry Leaders Use GEOWEB Geocells for Emergency Repairs

In addition to slope protection, GEOWEB Geocells are a reliable and fast solution for long-term soil stabilisation when railroads need to repair washouts and address track subsidence and settlement issues.

Available as emergency repair 'kits', the GEOWEB Geocells are ideal for providing an immediate response to unexpected repairs. In the US, Class 1 railroads stock this material regularly so they can quickly respond to such unforeseen circumstances. The GEOWEB stock covers 2,700 square feet with one pallet or 120,000 square feet for a truckload. Each GEOWEB section is packaged in collapsed, easy-to-handle sections that are 8.5ft x 27ft. The repair kits come with the ATRA® key connection device – a turn-and-lock key, that is three times faster and stronger than stapling.

The GEOWEB emergency repair kits are ideal for constructing and repairing track ballast, access roads, embankments, earthen berms, bridges, channels and right-of-way areas.

