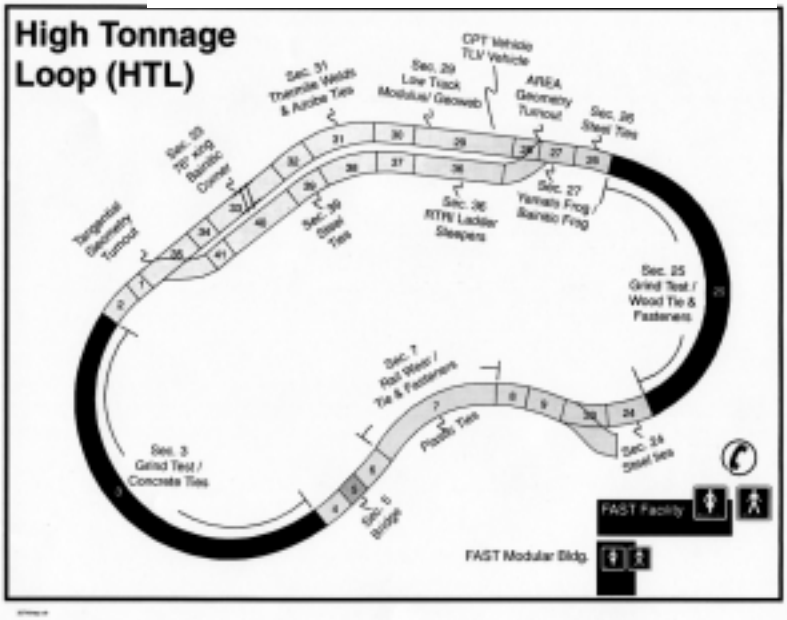
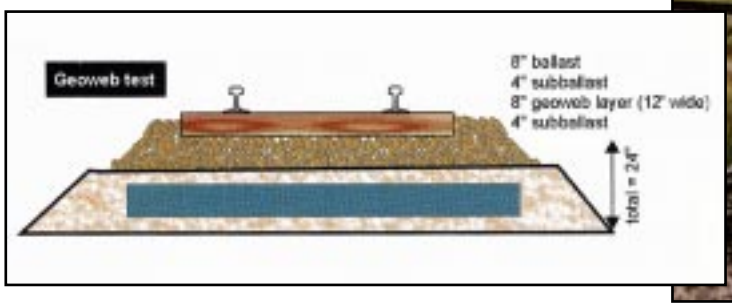
GEOWEB® System

Superior for Heavy Load Support

The Association of American Railroads (AAR) maintains a very special research facility near Pueblo, Colorado, the Transportation Technology Center (TTC). Within the TTC is the Facility for Accelerated Service Testing (with the apt acronym "FAST") where years of extreme stress conditions can be applied in a few months. On FAST's High Tonnage Loop, a 2.7 mile "loop of track" dedicated to High Axle Loads (called HALs, denoting 35-tons or more), some remarkable testing has been performed on the GEOWEB Cellular Confinement System.

The goal of the testing at FAST was to evaluate the effects of repeated heavy loads on the *Perforated* GEOWEB System installed over a soft subgrade. The soft subgrade was constructed from highly expansive Vicksburg Buckshot Clay, an ASTM "Reference Soil" imported from Mississippi for this purpose. The clay was placed at 30% moisture content in a five foot deep, 700 foot long trench along a section of the High Tonnage Loop, known as the Low Track Modulus (LTM) test zone. The test train operations are designed to accumulate approximately 1 million gross tons (MGT) per day, running on a continuous basis at no more than 40 mph speed. Numerous geosythetic materials had previously been tested under the track in the LTM zone, but ballast tamping was still required on an average every 15 MGT of loading. This time, however, the *Perforated* GEOWEB System was placed in the sub-ballast layer in readiness for the repeated application of 39 ton axle loads. To ensure that the testing would capture the "worst case" condition for clay subgrades, fire hoses were used to simulate two 500 year rainfall events, saturating the highly expansive clay subgrade during a dry mid-winter period between snow storms and snow melt conditions. Researchers found that the support offered by the *Perforated* GEOWEB System was not affected by the added water.





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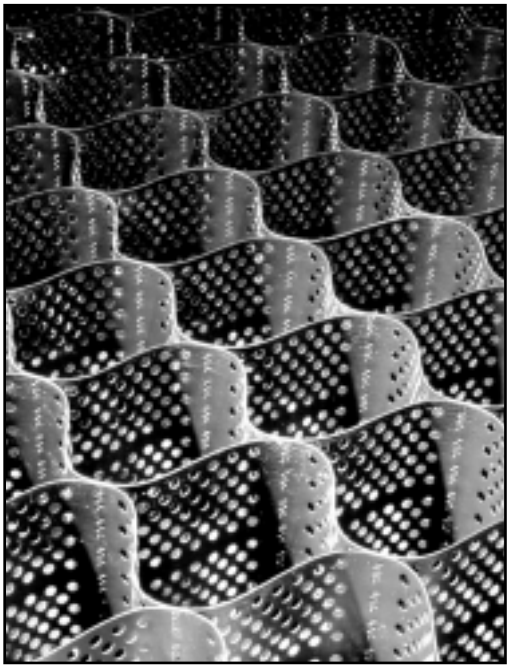
The *Perforated* GEOWEB® System is a versatile high density polyethylene "honeycomb" which can be used for load support, earth retention, slope protection, and channel protection applications. When properly installed for load support applications, loads are spread across the system and the three-dimensional webwork behaves like a stiff but flexible horizontal laminar element beneath the load bearing surface. The GEOWEB Cellular Confinement System has prior to this testing provided excellent support across soft subgrade conditions for other heavy rail applications, for railroad intermodal yards with daily truck traffic and semi trailer parking, and for other heavy load and soft subgrade problems common to highway and transportation structures.



Prior to installation of the *Perforated* GEOWEB System, the unreinforced track over this section of highly expansive clay had required ballast tamping every one million gross tons (MGT) of loading under 315,000-pound car operation. An early report on the testing of the GEOWEB installation prepared by Steve Chrismer at TTC in *Railway Age* (9/97) noted that the track geometry error was still well within acceptable limits after (at that time) 64 MGT operation (already more than 4 times the average reinforcement benefit provided by other geosynthetic product technologies such as geogrids and geotextiles). Steve commented that the testing and track geometry measurements would continue "at least until the track requires surfacing so that the actual improvement in tamping cycle can be determined."

However, two years later, Joe Lopresti, who replaced Steve Chrismer on this project, indicated that, after almost 180 MGT, still with only minimal loss of track geometry, TTC had decided to stop waiting for the track to "require resurfacing." They have since discontinued the testing and will eventually remove the GEOWEB installation in order to free up this section of soft deformable clay subgrade for other planned projects. After more than two years torture testing with a total load of 206.6 million gross tons (including the incidental train traffic involved in maintaining the less successful sections) the GEOWEB section continued to perform flawlessly. At the time monitoring was discontinued by TTC the GEOWEB installation had provided almost 14 times the average reinforcement benefit of other geosythetic products tested and with no indication of reduced system effectiveness or need for ballast tamping.

Example of GEOWEB System installation for track reinforcement.

The outstanding performance of the GEOWEB Cellular Confinement System in this "worst case" field testing program conducted by the Association of American Railroads correlates well with field installations and research programs conducted with the GEOWEB Cellular Confinement System for highway applications and for rail applications by other national rail organizations such as British Rail, Canadian National Rail and Japan Rail. The research at the AAR facility also further supports the evidence that the GEOWEB cellular confinement technology offers far greater performance benefits for load support applications than geogrids and geotextile products, and it offers a solution for situations where other geosynthetic products fail to deliver long term stabilization.

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