



Attack the Threat



CASE STUDY **Battling Frost Heave** on the **Alaskan Highway**

PRODUCT

Mirafi[®] H₂Ri

APPLICATION

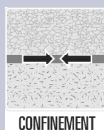
Frost Heave/Subgrade Stabilization

LOCATION

Dalton Highway, AK



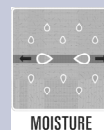
DRAINAGE



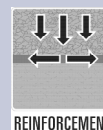
CONFINEMENT



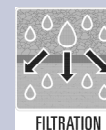
SEPARATION



MOISTURE
MANAGEMENT



REINFORCEMENT

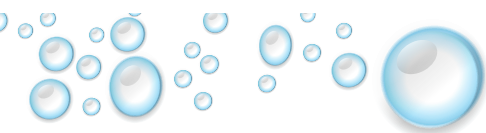


FILTRATION

THE CHALLENGE

Keep one of Alaska's vital roadways operational in an extreme northern environment.

The Dalton Highway is one of the most isolated roads in the United States. However, it serves a large amount of truck traffic because it is the only route for ground transportation between the oil fields at Prudhoe Bay and the city of Fairbanks. The extreme northern environment causes degradation of this 500-mile highway due to frost heave and thaw weakening. One problem section, at mile post 110, known as Beaver Slide experiences severe deterioration during Spring thaw due to shallow groundwater that runs downslope on an 11% grade under the highway. The water pools up in the road embankments and causes frost boils that lead to road damage.



JOB OWNER Alaska Department of Transportation
ENGINEER University of Alaska - Fairbanks
CONTRACTOR Alaska Department of Transportation
DATE OF INSTALLATION August 2010

 **TENCATE**
GEOSYNTHETICS

THE DESIGN

Beaver Slide was chosen by the Alaska Department of Transportation as a good location for a field validation study using Mirafi® H₂Ri moisture management system due to the deterioration issues and frequent maintenance required along this area. The University of Alaska Fairbanks was researching the validity of Mirafi® H₂Ri to help build better roads in northern climates where frost heave damage is a recurring issue. The full-scale field study would help verify the Robustness and Resourcefulness of Mirafi® H₂Ri was to test it in a known problem area for the DOT. Along with Mirafi® H₂Ri, 22 sensors were placed in a grid like pattern to measure moisture levels and temperature changes throughout the roadway cross section.



THE CONSTRUCTION

Excavation of the existing road confirmed that an organic tundra layer was approximately 4-5 feet below the road surface. Frozen soil was also encountered along with water from the high ground water table. After excavation, two layers of Mirafi® H₂Ri were Rapidly installed 18" apart with the first layer installed directly on the subgrade. Sensors were placed below and above the first layer of Mirafi® H₂Ri and finally sensors were placed above the second layer. The sensor leads were all bundled together and buried in a trench that led to a data collection unit on the side of the road.

THE PERFORMANCE

The site was monitored for a year by the researchers at the University of Alaska Fairbanks and employees of the Alaska Department of Transportation. The sensors showed that Mirafi® H₂Ri is transporting water across the road section without allowing the water to boil through the roadway and cause soft spots. In fact, it was observed that the section where Mirafi® H₂Ri was installed was in very good shape, while the areas where Mirafi® H₂Ri was not installed were at times nearly impassable. The unique strength characteristics combined with the hydrophilic and hygroscopic wicking fiber in Mirafi® H₂Ri provide Redundancy to the road system and was an ideal solution to provide stability and Robustness at the Beaver Slide area on the Dalton Highway. Furthermore, by enabling staged construction, the roadway was kept open the entire time, minimizing impact to traffic, reducing construction costs and time, thus having a positive effect on sustainability.

