



Case Study

application Frost Heave/Subgrade Stabilization
location Dalton Highway, AK
product Mirafi® H₂Ri

job owner
engineer
contractor
date of installation

Alaska Department of Transportation
University of Alaska - Fairbanks
Alaska Department of Transportation
August 2010

TenCate develops and produces materials that function to increase performance, reduce costs and deliver measurable results by working with our customers to provide advanced solutions.

THE CHALLENGE

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. One problem section, at mile 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.

THE DESIGN

Beaver Slide was chosen by the Alaska Department of Transportation as a good location to challenge Mirafi® H₂Ri* geosynthetic due to the deterioration issues that it experienced in the past. The University of Alaska Fairbanks was researching the validity of Mirafi® H₂Ri to help build better roads in these northern climates where frost heaving is an issue. The last step to prove the effectiveness 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.



Installation of Mirafi® H₂Ri on the Beaver Slide area.



Spreading of base course over Mirafi® H₂Ri geosynthetic.

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 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 proved to be an ideal solution to provide stability at the Beaver Slide area on the Dalton Highway.

*US Patent #7,874,767



One of the sensors being buried to measure moisture levels and temperature changes.



Truck traffic over the Beaver Slide area.



One of many oil rigs that traffic the Beaver Slide area of The Dalton Highway.

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