

Case Study

application | Test Section for Haul Roads
location | South Central, US
product | Mirafi® HP270

job owner | N/A
engineer | Design Build Project
contractor | N/A

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

A construction contractor needed to create 54 miles of heavy-duty haul roads across local flood plains. The design heavy vehicle wheel loadings on the roadway were 45,000 lbs with approximately 70 passes per wheel. The subgrade soil was classified as a silty sand. The aggregate used to construct the unpaved roads is a caliche, which is a mixture of pit-run stone and sand, with some of the particles being 6 inches. The caliche fill had to be trucked from more than 70 miles away from the site. Testing was performed on the caliche and subgrade. When test rolling was performed over the caliche, where geotextile stabilization was not placed, deformations of 2-4 inches occurred at the roadway surface. This undesirable deformation would result in the loss of caliche stone, both during initial and long term road construction. Based on these proof-rolling results, Mirafi® HP270 geotextile was recommended for the project.

THE DESIGN

The design was based on industry standard temporary haul road concepts, allowing a 2 inch rut depth to form at the surface, as the geotextile goes into tension. The designs identified that for soil subgrades with California Bearing Ratios (CBR) of 0.5%, 1.0% and 1.5%, the following aggregate cross sections were required with and without the inclusion of Mirafi® HP270:

CBR	Rut Depth	Caliche without Mirafi® HP270	Caliche with Mirafi® HP270
0.5	2 inches	27 inches	17 inches
1.0	2 inches	15 inches	10 inches
1.5	2 inches	9 inches	6 inches

THE CONSTRUCTION

The haul road area at the site was stripped of vegetation and then the subgrade was wetted down and rolled 5 times with a smooth drum roller until minimum deformation of the subgrade occurred under loading. Two roll widths of Mirafi® HP270 geotextile were placed for each 20 ft wide road section. Because of high residual water table and the potential for flooding of the site during rain events, a raise in grade was required at some locations. Before installing the geotextile, a sheep's foot roller was used to compact the existing soil and light vegetation, then suitable fill placed where they needed to raise the grade above standing water elevation. After the subgrade was leveled, Mirafi® HP270 geotextile was installed and the caliche was placed, graded and compacted. The required thickness of the caliche depended on the elevation of the water table adjacent to the roadways and whether the soil contained more sand than silt. An approximate 8" aggregate thickness sufficed for most of the project cross sections.



Placing caliche on textile road test section.



Placing caliche on textile over parking lot.



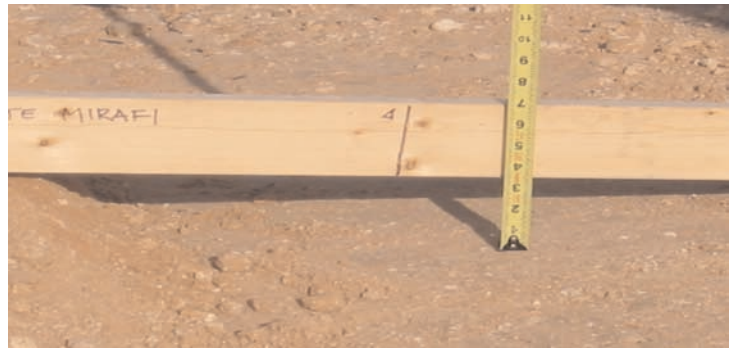
Wet subbase before placing geotextile.

THE PERFORMANCE

Proof-rolling tests were performed on the caliche and subgrade both with, and without geotextile stabilization. Upon rolling over the caliche, where a Without geotextile stabilization, deformations of 2-3 inches occurred as shown in the adjoining photos. This deformation would have resulted in the loss of the imported caliche fill, both during initial road construction and long-term. Because of the high water table anticipated at many of the roadway locations, the geotextile stabilization must have very good permittivity, high strength at low strains (high tensile modulus). To meet these requirements, Mirafi® HP270 stabilization geotextile was selected for the project. A biaxial geogrid was also considered for haul road stabilization for the project but was rejected since the geogrid has large openings which would allow the intermixing of soft, wet subgrade soils with the caliche, resulting the degradation of the pavement section.



Mirafi® HP270 geotextile shows capsulation of base material in rutting zone.



3" to 4" rutting after one pass of construction equipment.

BELOW: Aerial view of test section.



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