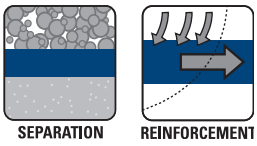
TENCATE Mirafi®



Case Study

application	Pile Supported Embankment Load Transfer Platform	job owner	City of Lakeland
location	Lakeland, FL	engineer	Tierra Inc. & Hayward Baker
product	Mirafi® HS400 (18,000 yd²) & BXG11 (35,000 yd²)	contractor	Kimmins & Hayward Baker
		installed	October 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 City of Lakeland, FL issued a design-build for the East West Connector Project that included connecting Harden Boulevard and S. Florida Avenue. The new connector road runs through an area of Polk County with several old strip mines. The old mine sites contain deep pockets of Phosphatic Slimes, which are mine spoils that have been backfilled into the old mining operations from years ago. TenCate Geosynthetics and R. H. Moore were contacted by the design team looking for a geosynthetic solution for bridging over the deep slimes.

THE DESIGN

The roadway needed to be built up 14' in elevation from the existing grade. Due to these large fill heights and the extremely soft ground conditions, ground improvement techniques were required. The design included using cast-in-place piles through the slimes down to the limestone shelf in the region. The piles ranged in depth from 14 to 35 feet. In order to minimize differential settlement between pile locations and provide for a flexible pile cap for the embankment system, high strength geosynthetics were used to construct the load transfer platform on top of the piles. Mirafi® HS400 high strength polyester geosynthetic and Mirafi® BXG11 woven polyester geogrids were chosen as the reinforcement for the load transfer platform. The design called for 3 layers of high strength geosynthetics. The bottom layer was designed using Mirafi® HS400 high strength geotextile to provide both reinforcement and separation from the soft mine slimes. The geosynthetic provides high reinforcement strength and prevents the intrusion of the mine slime into the controlled granular fill of the embankment. The 2 upper layers of reinforcement used Mirafi® BXG11 biaxial geogrid placed within the embankment fill. The vertical spacing between the 3 layers of reinforcement was 12 inches.

This 3 layer system provides a highly stable system to transfer the loading from the planned 14' feet of fill to the cast-in-place piles.

Installation of Cast-In-Place piles prior to the geosynthetic installation, showing pile caps.

Installation of structural fill over Mirafi® HS400.

THE CONSTRUCTION

The construction was a joint venture between Hayward Baker and Kimmins Contracting. Hayward Baker provided the design for the piles and the load transfer platform and installed the grouted columns. Kimmins Contracting was the general contractor and performed the geogrid/geotextile installation and grading work.

The site was extremely challenging due to the extremely soft mine "slime". However, once the piles were installed and Mirafi® HS400 was placed, heavy construction vehicles, including rubber tired equipment, were able to access the area easily. Installation moved quickly and the 3 layer geosynthetic reinforcement system provided a strong working platform making site access much more manageable.

THE PERFORMANCE

The use of high strength geosynthetics as a load transfer platform for the pile supported embankment provided a cost effective solution for this very challenging project. The extremely soft ground conditions were managed with a very easy and quick installation solution. More traditional alternatives, like excavation and replacement, or a more rigid platform, would have cost more and required a longer construction schedule. Geosynthetic pile load transfer platforms provide for a sustainable solution for embankments on soft ground.

Installation of the structural fill on top of Mirafi® HS400 .

Installation of the 1st layer of Mirafi® BXG11 .

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