

Case Study

application	Reinforced Soil Bridge Abutments
location	Luverne, MN
product	Miragrid® 7XT & Mirafi® HP570

job owner	Rock County and MnDoT
engineer	Erickson Engineering
contractor	Minnowa Construction
date of installation	June 2013

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

Rock County in southern Minnesota closed the antiquated timber bridge that carried County Road 55 over a regional railroad in 1993. They needed to replace the bridge structure however, up until now, the construction methods and materials for building single span bridges have been extremely expensive. This bridge needed to be built as quickly and inexpensively as possible.

THE DESIGN

To meet the limited budget for building the abutments, the Federal Highway Administration (FHWA) Geosynthetic Reinforced Soil Integrated Bridge System (GRS-IBS) was chosen. This system is the core of FHWA's initiative for innovative bridge construction for this type of abutment. It is derived from examples of ancient structures that utilize closely spaced organic materials to reinforce soil. The principles are the same for this modern design adaptation by using angular, crushed gravel with high strength geotextile or geogrid in frequent layers. The interaction of these components stabilize the structure internally. TenCate Miragrid® 7XT geogrids and Mirafi® HP570 geotextiles were chosen for this project. Although there are now over 100 GRS-IBS bridges in service throughout the country, the Rock County GRS-IBS bridge #67564 is the first in the state of Minnesota. It is also one of the tallest to date at 24 feet. The construction technique did not require deep foundation design and thus can be completed much less time, usually weeks. It also utilizes basic earthwork methods and practice with minimal environmental impact.



The north abutment site with reinforced soil foundation preparation.



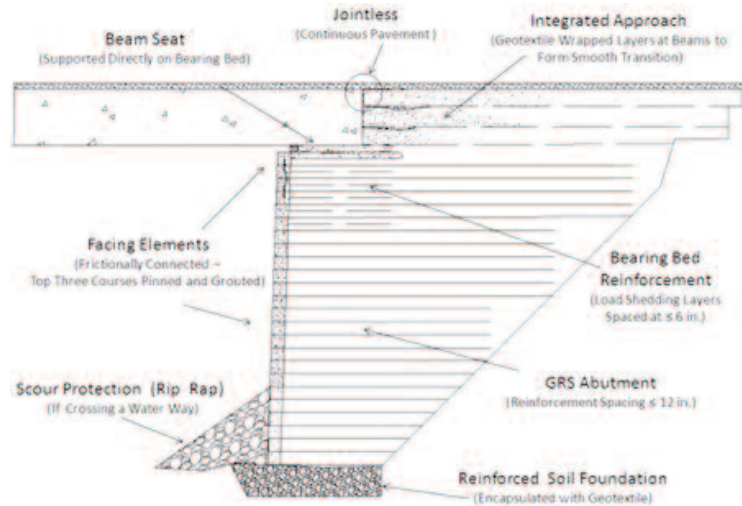
Mirafi® HP570 being used to construct the reinforced soil foundation.

THE CONSTRUCTION

TenCate Mirafi® geosynthetics fit perfectly into the design for two of the components of this bridge system. The Reinforced Soil Foundation was constructed using Mirafi® HP570 to achieve the needed confinement and reinforcement for the base support of this structure. It consists of select gravel compacted and encapsulated in the Mirafi® HP570 geotextile fabric to function as an integral base for the abutment. Next, the abutment was built by placing alternating layers of select gravel and geosynthetic reinforcement in 4"–8" lifts. The project engineer chose Miragrid® 7XT for the reinforcement between the compacted fill material for its strength and constructability properties. Miragrid® 7XT was placed horizontally at 8" between concrete masonry facing units and at 4" near the top to reinforce the bearing bed which supports the precast concrete bridge beams. The ease of construction using the flexible TenCate materials along with the simple installation techniques increased worker safety and decreased the time to complete the project.

THE PERFORMANCE

The bridge is now in service and the performance is outstanding. Monitoring has been in place since the beginning of construction with no issues. In addition to saving the county significant construction costs, there has been no maintenance cost.



GRS-IBS typical cross section.



Mirafi® 7XT being installed to reinforce the south abutment.



The finished GRS-IBS.

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