



Case Study

application | **Bridge Abutment**
location | **King County, WA**
product | **Mirafi® HP570**

job owner | **King County, WA**
engineer | **King County, WA**
contractor | **Quigg Bros Inc., Aberdeen, WA**

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

King County was forced to close the Sunday Creek bridge after finding it to be structurally deficient. Unfortunately, with the increase in private logging, it was determined the bridge would have to be replaced with a more functionally designed bridge that was structurally sound. The original bridge was constructed in 1962 and reconstructed in 1977 with four timber logs which were 2 to 3.7 feet in diameter and were supported by log cribbing. The timber logs used to construct the original bridge came from the nearby forest and were untreated and unmilled, making them very susceptible to quick environmental degradation. In October of 2008 the bridge was closed due to its worsening condition and due to the increased risk of failure.

THE DESIGN

To replace the antique log bridge, King County chose to design a superstructure type bridge. The new bridge structure was designed to handle the ever increasing logging traffic. The bridge was designed with a pre-fabricated steel pony truss support system. This alternative is the least costly of the bridge types evaluated, has the least environmental impact and would be the easiest to construct and transport to the site in the shortest possible time frame. The new pre-fabricated pony truss was designed to be supported by two Mechanically Stabilized Earth (MSE) abutments. The MSE abutments were designed using Mirafi® HP570 high strength polypropylene woven geotextiles in thin lifts with compacted granular fill to provide a self-supporting gravity structure.

THE CONSTRUCTION

Construction of the new bridge began in the

spring of 2009. The first challenge was to remove the existing timber bridge and log cribbing abutments and replace them with a temporary bridge for construction access. The second phase of the project was the construction the new MSE abutments using Mirafi® HP570. The contractor first installed sheet piles into the shoreline to support the construction of the new geotextile reinforcement. The existing soft soils were then excavated from behind the sheet piles and the first layer of Mirafi® HP570 was placed. The geosynthetic was installed with 8-inch vertical spacing for a maximum depth of 10' below the water line.



Original timber bridge supported by timber cribbing.



Excavation for the new bridge abutment.



Blow torched, cut out center of CMU blocks where Mirafi® HP570 had been placed, to be filled with crushed rock.



Construction of the new MSE bridge abutment using Mirafi® HP570 and thin lifts of compacted fill.

Protective & Outdoor Fabrics | Geosynthetics
Aerospace Composites | Industrial Fabrics
Armour Composites | Synthetic Grass



Finished bridge abutment constructed using a wrapped face and block wall with Mirafi® HP570.

A high friction permeable gravel backfill was imported to the site and compacted to create an extremely stable bridge abutment base. Once above the water line – CMU blocks were stacked to create the face of the MSE abutment. Mirafi® HP570 was placed between the CMU blocks as they were stacked. A blow torch was then used to cut the holes out of the Mirafi® HP570 geotextile so fill could still be placed into the CMU blocks.

THE PERFORMANCE

At this time the bridge remains closed due to the winter weather, however it is scheduled to be completed in the Spring of 2010. The bridge abutments are very secure thanks to the design help from FHWA and Ten Cate Geosynthetics.



Finished bridge abutment constructed using a wrapped face and block wall with Mirafi® HP570.

TenCate™ Geosynthetics North America assumes no liability for the accuracy or completeness of this information or for the ultimate use by the purchaser. TenCate™ Geosynthetics North America disclaims any and all express, implied, or statutory standards, warranties or guarantees, including without limitation any implied warranty as to merchantability or fitness for a particular purpose or arising from a course of dealing or usage of trade as to any equipment, materials, or information furnished herewith. This document should not be construed as engineering advice.

Mirafi® is a registered trademark of Nicolon Corporation.

0510