



Case Study

application	Subgrade Stabilitation
location	Rice County, MN
product	Mirafi® HP770PET

job owner	Rice County, MNDOT
engineer	Gale-Tec, Engineering, Inc.
contractor	ParTek Supply, Inc. & Southern Minnesota Contracting, Inc.

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 widening of C.S.A.H. 2 in Rice County, MN required the widening of a 7.32m (24 ft.) wide 2-lane paved road. The widening would take the road crest from 7.32m (24 ft.) to 12.8m (42 ft.) in width and expand the side slopes from 2H:1V to 4H:1V. The roadway crosses 2 swamp areas, one being 213.4m (700 ft.) and the second being 182.9m (600 ft.) The present 2-lane road was constructed in 1966; at that time the swamp areas were only partially excavated to a depth of 3m (10 ft.) and then backfilled with clay.

A subsurface exploration in the two swamp areas identified the peat extended to depths of 13.7m (45 ft.) below the existing pavement surface.

THE DESIGN

Though the peat beneath the roadway core was compressed under the weight of the clay fill, the peat that exists outside of the present roadway has a stable crust but is underlain by soft peat. A fill placement over this soil would cause mudwaving of the peat during construction. The engineer chose a high strength geotextile reinforcement plan that included seaming the panels together to maintain continuity, and then a stage loading and surcharge procedure. In order to achieve the necessary factor of safety for side slope stability, the designer specified Mirafi® HP770PET

THE CONSTRUCTION

The Mirafi® HP770 PET was cut to length in panels by ParTek Supply, delivered to the project site and then placed with the machine direction of the textile perpendicular to the centerline of the road. The high machine direction

strength of the geotextile maintains the integrity of the embankment during construction. The panels needed to be sewn together to maintain continuity, and that is one of the reasons that the engineer excluded geogrid from the specification. Overlapping would allow for the possibility for mud to move up between the panels of material. The engineer required 100% cover-

ages; age be maintained during the the filing operations; seaming was the only way to satisfy this requirement.

A bonded polyester thread (207 Denier) from Alliance Thread Supply was used. Trials were performed in order to determine what type of seam would result in what strengths. Two rows



Due to the soft, peat subsurface, Mirafi® HP770PET was required to complete the road widening project



Overlapping the fabric would allow the mud to move up between the panels. Seaming was required to maintain 100% coverage.

of stitching creating a Prayer seams with stitches installed at a rate of 4.5 stitches per inch resulted in a seam strength of 24.96 kN/m (141 lbs/in) (ASTM D-4884). A J-seam was also tested. Two rows of stitching with 5.5 stitches per inch resulted in a seam strength of 28.9 kN/m (165 lbs/in). As a result of the testing, the Prayer seam, which is the simpler seam to create in the field, was selected. This geotextile was sewn with a 2-thread double locked stitch for security of the stitch and seam strength and quality. Two rows of stitching were created with the seams being 0.5 inch apart. The stitches per inch setting on the machine was set at 4.5 stitches/inch based on the testing. Too few stitches per inch and the sewn seam may not be strong enough. Too many stitches per inch and the needle penetrations may weaken the fabric, resulting in a “zippering” or “tear along the dotted line” effect. Approximately 5.5m (6 yards) of thread was used for each yard of geotextile sewn.

THE PERFORMANCE

The raise in grade of 3m (10 ft) was instituted over a 4-month time period, in order to allow excess pore pressures to dissipate within the peat. The high strength geotextile mobilized its strength while the seams maintained the integrity of the fill over the swamp soils.



A prayer seam was used to stitch the panels of Mirafi® HP770PET.



After the Mirafi® HP770PET panels were seamed together, 3m (10ft) of fill soil was installed and left for 4 months to compact the excess pore pressure of the peat.

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