

Case Study

application	Subsurface Drainage
location	407ETR, Toronto, Ontario, Canada
product	Mirafi® 140NC

job owner	407ETR
contractor	AECON, LTD.
date of installation	April 2005

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

Highway 407ETR is a privately owned and operated electronic toll highway which runs 108km (67mi) east and west just north of Toronto-Canada's largest city. The 407ETR was the world's first all-electronic, open access toll highway. The highway first opened in October 1997 and at the time was one of the largest road construction projects in Canadian history. Currently more than 300,000 vehicles use the highway on a daily basis.

In 2004, 407ETR tendered a \$30 million dollar contract to add 22 lane kilometers (13.5mi). The contract consisted of widening the existing 4 lane highway to 6 lanes. Part of the work was installation of a geotextile-wrapped pavement edge drain along the entire length of the new pavement system. The first phase of the 407ETR used over 60km (37mi) of a similar edge drain technique.

THE DESIGN

The highway widening included excavation of the soils adjacent to the highway, placement of a 900mm (35in) crushed aggregate base and doweling of the existing concrete pavement to accept the new 300mm thick poured concrete road surface. Also provided for in the design was a pavement edge trench drain 400mm x 600mm x 400mm (16in x 24in x 16in). An MTO class 1 nonwoven geotextile was specified for the trench wrap. The pavement edge drain consisted of a 100mm (4in) HDPE BIG "O" drainage pipe and 10mm (3/8in) drain rock, all encapsulated in TenCate Mirafi® 140NC geotextile which met the minimum specified values.



Backfilled drainage trench.



Tractor drawn hopper with Mirafi® 140NC, Big "O" pipe and drain rock.

THE CONSTRUCTION

Mirafi® 140NC was shipped to the project site and factory cut to 2.5m (7.5ft) widths to minimize waste. This width allowed for a minimum overlap of 400mm (16in). A wheeled trenching machine excavated the trench to the required depth. A tractor-drawn hopper followed, which placed the Mirafi® 140NC, inserted the 100mm (4in) perforated HDPE drain pipe, and dumped the drain rock, all in one continuous operation. At specified intervals, a T-connector was inserted and the pipe was outleted to the highway median. No compaction was required for the drainage rock.

THE PERFORMANCE

The performance of this drainage system, which included Mirafi® 140NC geotextile, has proven in the past to be excellent. The geotextile will prevent fines from entering the drainage system which could possibly plug or reduce its drainage capacity. A properly functioning drainage system will ensure the long-term performance of this very unique highway.



Mirafi® 140NC, Big "O" pipe and drain rock being installed.

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