TENCATE
Mirafi

Soil Reinforcement

Case Study

application	Reinforced Steepened Slope
location	Edmonton, Alberta, Canada
product	Mirafi® Miragrid® and Geocells
job owner	Alberta Transportation
contractor	Kiewit
engineer	Thurber Engineering Edmonton, AB. Canada

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

With the rapid expansion of the City of Edmonton, and with the current Whitemud freeway being prone to significant traffic congestion, a new freeway was constructed to reduce future increased congestion. The new Anthony Henday freeway encircles the southern and western boundaries of the city. The construction of the freeway necessitated crossing the North Saskatchewan River and various creeks including Whitemud Creek. The Whitemud Creek crossing constructed over underground and open cut coal mines presented a challenging slope stabilization project. Two embankment stabilization systems including Mechanically Stabilized Earth Walls (MSE) and Reinforced Geogrid Slopes were considered.

THE DESIGN

Miragrid® geogrid reinforced slopes were required in the four quadrants of the culvert crossing; i.e. the southwest, northwest, southeast and northeast. Slopes immediately adjacent to the four quadrants of the concrete structure are 1H:1V. Outside the culvert zone the slopes were gradually flattened from 1H:1V to 3H:1V. The Maximum slope height was 11m (36ft). Stability analyses were carried out to evaluate the slope stability of the reinforced slope configuration for each quadrant and to determine the reinforcement requirements. It was determined for the 1H:1V and 2H:1V slope areas that Miragrid® geogrid 10XT high tenacity polyester geogrid, with an embedment of 21m (69ft) spaced at 100cm (39in) was required. For slopes inclined at between 2H:1V to 3H:1V, the

Looking Northwest at the Whitemud Creek overpass arch.

Miragrid® 10XT geogrid was spaced at 100cm (39in) intervals x 15m (49ft) long. For all slope configurations Miragrid® geogrid 2XT 1.8m (6.0ft) long was used for the secondary reinforcement, spaced at 50cm (20in) intervals. On all the slopes, a 10cm (4in) large cell geocell system was used for erosion control.

THE CONSTRUCTION

Construction on the reinforced slopes started in the spring of 2004 and was completed by the Fall of 2005. Custom roll lengths of Miragrid® 10XT geogrid corresponding to the required geogrid embedment lengths were supplied to the project to minimize waste. The contractor was faced with numerous challenges, those including staged construction of the slopes (maximum 1m (39in) thick soil lifts per week), fill soils that were above optimum moisture content, and a summer with above normal precipitation.

Above: 10cm (4in) Geocell material being installed.
Below: Looking Southeast at the first layer of Miragrid® 10XT.

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THE PERFORMANCE

Extensive monitoring during construction confirmed that the slopes were performing as designed. Due to the ease in constructability and the economy of the reinforced slopes the owners were able to see a 50% cost savings over the alternative MSE wall system.

Pre-cut lengths of 21m (69ft) Miragrid® 10XT geogrid ready to be rolled out.

15m (49ft) and 21m (69ft) lengths of Mirafi® Miragrid® installed and ready for backfill.

Below: Positioning rolled lengths of Miragrid® geogrid on inside curve of slope.

Installing stakes to keep geogrid positioned.

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