TENCATE Mirafi®

SOIL REINFORCEMENT

Case Study

application	Wrapped Face Retaining Wall with Concrete Panels	job owner	Washington State DOT
location	Spokane, WA	engineer	WSDOT/Cornerstone Geotechnical
product	Miragrid® 3XT, 7XT, 10XT (66,500 sq. ft of wall face) & Mirafi® 160N (36,000 sy)	contractor	KLB Const. & AAA Rockery Const.
		installed	June - July 2010

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

This multi-million project addresses the need for a major improvement to allow motorists and freight to move through metropolitan Spokane along the corridor from I-90 to US 395 at Wandermere. The needs of the corridor are indicated by the increasing congestion and other operational and safety issues on the existing street network. The project will provide a facility for balanced transportation including park and ride lots to support transit and vanpooling operations, as well as an expanded and enhanced pedestrian/bicycle facility. Right of way will also be reserved for possible future light rail use. This project will complete a drivable link between US 2 and Wandermere through the construction of two bridges and a large geosynthetic wrapped face wall with precast concrete panels attached to the face.

THE DESIGN

The Washington State Department of Transportation (WSDOT) has recently published new standard drawings D-3.11-00 (see Figure 1) on geosynthetic wrapped face retaining walls with precast concrete panels that are attached to the face of the geosynthetic wall. To bid a project of this magnitude, the contractor required accurate design quantities prior to the bid. TenCate Geosynthetics and ACF West in Woodinville, WA assisted with the preliminary design calculations of the geosynthetic retaining wall structures so that accurate quantities could be achieved prior to bidding. Together, we delivered a proposal to the contractor for the design and materials for the wrapped face wall. The design included a 55-ft. high retaining structure that utilized Miragrid® XT geogrids to a maximum embedment of 32-ft, and wrapped in 1.25' lifts with Mirafi® 160N wrapped into the face to help retain the select crushed rock backfill. The attachment of the concrete panels was done using a 7/8" galvanized rod attached to the panel and embedded into the middle of the roadway where it was anchored. ACF West and TenCate Geosynthetics provided the contractor preliminary designs at the time of bid and final designs and shop drawings after the job was awarded.

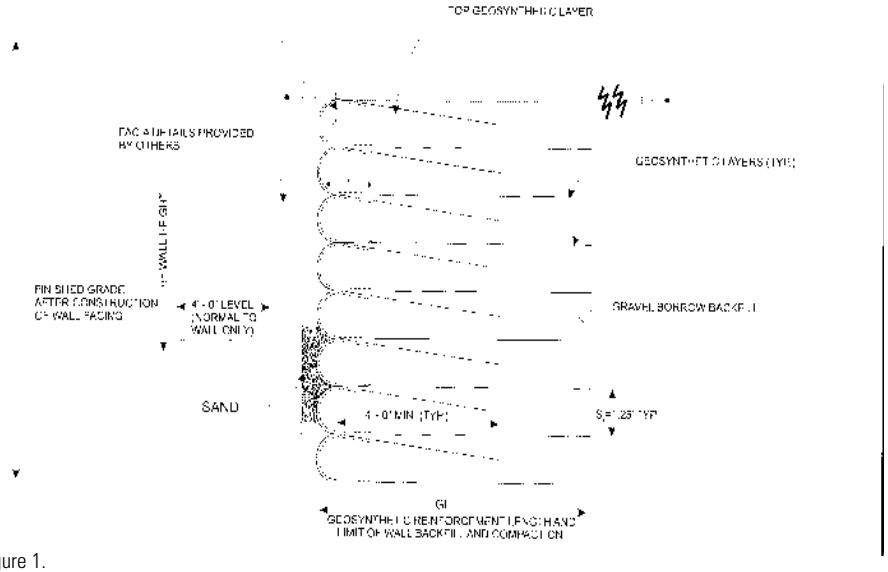

Figure 1.

Wood forms being used to achieve compaction at the face of the wall.

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THE CONSTRUCTION

To construct a wall of this magnitude is no small feat. Construction of the geosynthetic retaining walls was started by KLB construction and AAA Rockery and Construction in May of 2010 and quickly completed (except for the placement of the concrete panels on the upper wall section) in July of 2010. Construction of the geosynthetic wrapped face walls began by using wood forms anchored in place with steel angles to achieve adequate compaction at the face of the retaining wall. A select backfill of 3/8" minus crushed rock was used, and compacted to 95% ASTM D1557 Modified Proctor. After two lifts were built, the forms from the lower lift could be removed and placed to construct the next lift, thus using fewer materials. Compaction of the fill at the face is critical to achieving a very high-retaining wall with near vertical and uniform face to attach the pre-cast concrete panels to. Compaction was accomplished in small lifts using a large vibrating roller away from the face and a small plate compacter against the face of the wall. The minimum lift thickness was 6" to protect the reinforcement and 10" maximum to make sure they got full compaction. After the wall was completed, a footing was poured at the base of the wall to support the concrete face panels. The concrete panels were then lifted into place using a crane and attached to 7/8" galvanized rods that were embedded into the wrapped face wall during construction.

THE PERFORMANCE

The end result is a very cost-effective, very large and durable retaining wall with a sculpted pre-cast concrete face. Construction of the project is due to be completed sometime in 2011.

Lower wall section completed prior to placement of concrete panels.

Completed wrapped face wall prior to placement of concrete panels.

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