

## WHAT:

Use of Pyramid Grid™ for soil slope reinforcement.

## APPLICATION:

The application involved construction of a temporary earthen retaining structure, known as mechanically stabilized earth wall (MSE wall) for an approach embankment as a part of a box culvert installation.

## CHALLENGE:

Location was the biggest challenge with this project. Being alongside Trans-Canada Highway meant that working space needed to be confined to ensure safe traffic flow without affecting the construction schedule.

## CONVENTIONAL SOLUTION:

The conventional solution to this would involve a cofferdam however, cofferdams are constructed with sheet piling designed to be more of a permanent solution rather than a temporary one. In addition, sheet piling is a solution that is more suited to a larger footprint area and wouldn't work in the confines of this construction site. Being along a road is also far too dangerous therefore unfeasible for this site.

## TITAN SOLUTION:

Responding to both confined working space and safety considerations, Titan proposed a temporary MSE Wall solution using our Pyramid Grid™ designed for soil slope reinforcement.

The MSE wall was designed for two heights, 5.7m near the box culvert and 3.0m away from the box culvert. Each layer of geogrid was wrapped back into the fill (3/4" down) with a minimum anchorage length of 1000mm, and the vertical spacing between the layers was 500mm.

The wall was designed in accordance with AASHTO LRFD method using MSFW (3.0) software to calculate internal and external stability. And global stability was checked using ReSSA (3.0).

Not only was this a safe solution but it provided approximately 40% in material and time savings to both the client and the contractor.



Deployment of the Pyramid Grid™ with the importance of extending the grid in each layer as an overlap.



Lower-layer lift of granular over the Pyramid Grid™ being compacted. The orange lines represent the layers/thickness of granular to be placed over the grid.

## PRODUCT DESCRIPTION:

Pyramid Grid™ is a uniaxial polyester (PET) geogrid manufactured with high molecular weight and, high tenacity polyester yarns using a precision knitting process. This geogrid is dimensionally stable with uniform apertures that provide significant tensile reinforcement capacity in one direction. It's engineered to withstand both harsh construction conditions and aggressive soil micro-organisms. A black PVC saturation coating provides further chemical, mechanical and ultraviolet protection.

## BENEFITS:

- Provided approximately 40% in material and time savings compared to conventional reinforced concrete and gravity structure.
- Withstood differential structure.
- High connection capacity strength between facing and the geogrid.
- Reduced traffic disruption and ensured safety.



## PROJECT HIGHLIGHTS:

### Project:

Box Culvert Reinforced MSE Wall

### Location:

Manitoba -- Trans Canada Highway, West, adjacent to the La Salle River.

### Installation:

Summer 2017

### Owner:

Manitoba Infrastructure & Transportation

### Consulting Engineer:

Dillon Construction

### General Contractor:

MD-Steele

### Product Solution/System:

Pyramid Grid™

### Product Supplier:

Titan Environmental Containment Ltd. Manitoba, Canada

\*(Supplied the products, and offered design service and technical guidance)\*

Contact us for more information:

## TITAN ENVIRONMENTAL CONTAINMENT

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