

CASE STUDY

Box Culvert

Embankment Reinforcement/Retention System

Titan Earth Grid™, Pyramid Grid™ with

TE-C32 Erosion Control Blanket with Twisted Wire Gabion Baskets



WHAT:

Use of Titan Earth Grid™ with Pyramid Grid™ and TE-C32 coconut erosion control blanket with twisted blanket gabion baskets for reinforcement of a box culvert embankment.

APPLICATION:

Flooding, seasonal or other, takes a toll on local infrastructure and the environment. In Western Manitoba common valley flooding has, over time, weakened embankments adjacent to many concrete box culverts in the region. This had compromised the structural integrity and performance of a large concrete box culvert in the Rural Municipality of Cartwright.

CHALLENGE:

The challenge with this project was to reconstruct the 3:1 soil slope strata along the sides of the box culvert to withstand the elements and slow down or stop potential scour of the culvert surface.

CONVENTIONAL SOLUTION:

The conventional solution would be to use formed cast-in-place concrete. This is a labor intensive, time consuming and expensive construction method.

TITAN SOLUTION:

Titan designed a more cost-effective engineered earth system to mechanically stabilize the earth. This system included Pyramid Grid™, Use of Titan Earth Grid™, and TE-C32 coconut erosion control blanket with twisted wire gabion baskets.

The base was reinforced with Use of Titan Earth Grid™. Once that was completed the side slope embankment was constructed in compacted soil lift layers incorporating Pyramid Grid™ high tenacity uniaxial geogrid. This geogrid has high cross directional tensile strength and exhibits low creep. It also has high PH to take into consideration sub-standard compacted soil strata ensuring long-term performance of the structure.

The surface treatment was done with TE-C32 coconut erosion control blanket which worked as a system once vegetation germinated. We also supplied gabion baskets, TE-6 non-woven geotextile and silt fence.



Galvanized gabion baskets with twisted wire to reinforce the shape and strengthen the rock in place.



Geogrid Placement
Galvanized gabion baskets with twisted wire used to hold and stabilize the wall, with geogrid placement between.

► PRODUCT DESCRIPTION:

Pyramid Grid™

Pyramid Grid™ is a uniaxial polyester (PET), geogrid manufactured with high molecular weight, 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 environments and is unaffected by soil micro-organisms. A black PVC saturation coating provides further chemical, mechanical and ultraviolet protection.

TE-C32

A long-term, double net, 100% coconut fiber erosion control blanket designed for use on extreme slope and channel applications requiring erosion control for up to 36 months (depending on moisture, light, and environmental conditions). The blanket is sewn together on 1.5"(38.1mm) centers. TE-C32 meets all requirements established in the FHWA FP-03 as a Type 4 erosion control blanket for use on slopes with gradients not exceeding 1:1 (h:v) and has been tested by the National Transportation Product Program (NTPEP).

Titan Earth Grid™

Effective in increasing the bearing capacity and stabilization of low load bearing soils, Titan Earth Grid™ is manufactured out of virgin polypropylene (PP) using a unique punching and drawing process. Monolithic, it features uniform square/rectangular apertures, thick integral nodes, as well as thick and wide ribs having a high degree of molecular orientation continuing in part through the mass of the integral node.

When granular material is compacted over these geogrids it partially penetrates and projects through the apertures creating an interlocking action between the particles and the grid. This positive mechanical interlock enables the grid to resist horizontal shear from the fill and thereby mobilize the maximum bearing capacity on the soft subsoil.

This geogrid is engineered to be mechanically and chemically stable in aggressive soil environments and are not attacked by aqueous solutions of salts, acids or alkali.



TE-C32



Titan Earth Grid™

► BENEFITS:

- More cost effective than conventional cast in place concrete.
- Being able to work inclement weather reduced construction time.

► PROJECT HIGHLIGHTS:

Project:

Box Culvert Embankment Reinforcement

Consulting Engineer:

Stantec

Location:

RM of Cartwright

General Contractor:

Quantum Murray

Installation:

Spring 2015

Product Solution/System:

Titan Earth Grid™, Pyramid Grid™, TE-C32

Owner:

Rural Municipality of Cartwright, Manitoba

Product Supplier:

Titan Environmental Containment Ltd. Manitoba, Canada

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

Contact us for more information:

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