CASE STUDY

Erosion Control Application
Drainage Channel

ARMORMAX® Engineered Earth Armoring System

WHAT:

Municipal drainage channel slope erosion.

APPLICATION:

The application involved installation of 38,000 m2 ARMORMAX® with gabion baskets for a municipal drainage channel erosion control solution.

CHALLENGE:

The Reinland Drain is a municipal drainage channel in southeastern Manitoba that holds and drains intermittent water flow from regional spring melt/breakup and peak discharge events. Failing rip rap rock from heavy run-off flows had been causing reoccurring erosion of the channel slopes—an ongoing problem spanning 75 years.

CONVENTIONAL SOLUTION:

Rip rap had conventionally been used in this channel for erosion control but was continuously failing after storm/rainfall events causing massive undermining, and unfavorable costly results.

"Designed specifically for severe erosion challenges and proven to provide up to 75 years of design life."

TITAN SOLUTION:

The RM of Stanley was looking for a superior longer-term erosion control solution and engaged Stantec's engineering services. After a series of consultations with Stantec, Titan proposed the ARMORMAX® Engineered Earth Armoring System which is an advanced flexible armoring solution designed specifically for severe erosion challenges.

Proven to provide up to 75 years of design life ARMORMAX® consists of PYRAMAT®, woven three-dimensional High-Performance Turf Reinforcement Mats (HPTRM) with X3® fiber technology, and Engineered Earth Anchors (EEAs). In this application gabion baskets filled with rock were placed on the base floor of the channel, and a total of 38,000 m² of ARMORMAX® was installed on the channel slopes.

Being a winter installation, the extreme cold conditions made it challenging to penetrate the frozen ground with the system's B1 Anchors and 5mm 18" spikes. Our installation crew quickly adapted and switched to 10mm- 12" pins which were within the acceptable specification range and allowed for a successful installation. The channel was later hydro seeded by another contractor to ensure vegetative growth through the matts—critical to helping lock soil in place and protect against hydraulic stresses.

View of the channel with gabions at the floor base.

Channel Slopes with PYRAMAT® woven three-dimensional High-Performance Turf Reinforcement Mats and Engineered Earth Anchors.

POST INSTALLATION:

6 MONTHS (2018)

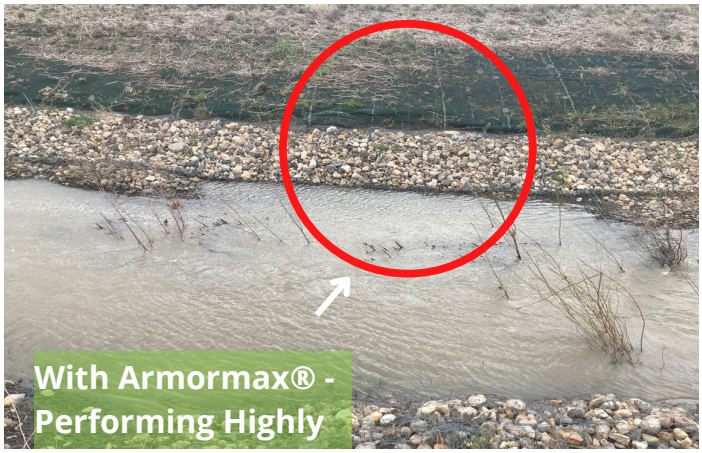
After nearly **one year** we observed outstanding vegetation growth and continue to monitor the site. As vegetation increases and deeper vegetative root structure forms, we are confident that the system will solidify and perform optimally.

Vegetation growing through the high-performance turf reinforcement mats. *6 months after install (Summer 2018).*

View of channel with vegetative growth. *6 months after install (Summer 2018).*

4 YEARS (2022)

Four years later, the Armormax® system is showing to have held up well, withstanding the harsh winters to date. The heavy snow and ice brought by the winter of 2021/2022 caused major flooding into Spring. The channel sustained high water levels and heavy flow. The section of the channel where Armomax® was installed is performing very well. The gabion mats on the channel floor are working as intended, and some sedimentation has allowed vegetation to grow. Failure is seen in the channels where Armormax® wasn't installed.



Vegetation growing through the high-performance turf reinforcement mats. *4 years after install (Spring 2022).*

Exposed failure without Armormax® system installed. *4 years after install (Spring 2022).*

PRODUCT DESCRIPTION:

ARMORMAX® Engineered Earth Armoring System is an advanced flexible armoring system consisting of PYRAMAT®, woven three-dimensional High-Performance Turf Reinforcement Mat (HPTRM) with X3® fiber technology, and Engineered Earth Anchors (EEAs).

Designed for severe erosion and surficial slope stability challenges, ARMORMAX® can be used in erosion control applications where additional factors of safety are required, including protecting earthen levees from storm surge and wave overtopping, and stream, river, and canal banks from scour and erosion. In addition, this system is ideally suited to protect storm water channels in arid and semi-arid environments where vegetation densities of less than 30% coverage are anticipated. For slope stability applications, the system can be further engineered to provide surficial slope stabilization to resist shallow plane failures.

BENEFITS:

- Provides up to 75 years of design life.
- Supports the EPA Green Infrastructure initiative.
- Recognized as a storm water Best Management Practice (BMP) and is proven to reduce erosion and reinforce vegetation for low-impact, sustainable design.
- Easy to handle, lightweight components for rapid installation.
- Use of lightweight equipment and general labor facilitates installation with limited site access.
- Aesthetically pleasing and more cost effective than conventional methods such as rock rip rap and concrete paving.

PROJECT HIGHLIGHTS:

Project:
Reinland Drain

Location:
Winkler, Manitoba

Installation:
February, 2018

Owner:
Rural Municipality of Stanley

Consulting Engineer:
Stantec

General Contractor:
Armcon Ltd.

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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