CCX™
Innovation on a Roll

# EROSION PROTECTION

## Project Info

- 08 / 12 / 21
- CCX-M™ Rolls
- 1,225m²
- Transverse layers
- Viche River (Poblado de Cube) Province of Esmeraldas - Ecuador
- Welding & Vayacons CIA. LTDA supervised by INNSOLUSA and OCP
- CCX-MAT™ (CCX-M™) Installed to prevent erosion to right bank of Viche River

INNSOLUSA
INNOVANDO PARA EL DESARROLLO


*The completed erosion control works on the Viche River*

In December 2021,CCX-M™ GCCM* was used to provide erosion protection to the bank of the Viche River in Esmeraldas Province, Ecuador, to prevent water from reaching and undermining the nearby OCP and SOTE pipelines.

The Viche River flows into the Esmeraldes River. Heavy winter rainfall in the catchment results in, increased flows in the Esmeraldes river causing damming of the Viche River, resulting in flooding and erosion on the river bank. With a measured erosion rate of 15.2m/year, it was predicted that the repeated flooding of the Viche river would reach the path of the pipelines within 3 years, risking an interuption of the crude oil transportation service at significant economic cost.

A number of alternative methods had been considered for the protection of the river bank, including the placement of gabions. However CCX-M™ was chosen primarily due to speed of installation (requiring less time to import and to install) reducing the need for heavy plant on site and for being economically the best option.

CCX-M™ is a Type II GCCM as defined in ASTM D8364 - Standard Specification for GCCMs. CCX-M™ is suitable for lining hydraulic structures with soil subgrades and was chosen for this project to suit the abrasion, wear and loading requirements. ASTM D8364 is the only internationally recognised GCCM specification standard and lists erosion control applications by three classifications, Type I, Type II and Type III. It defines the minimum performance values required for each type based on the use of test methods that are specific to GCCM materials. It is an important resource for clients, consultants and contractors wishing to ensure the GCCM used on their project is fit for purpose.

The works were carried out by Welding & Vayacons CIA LTDA with the supervision of the client OCP and the supplier INNSOLUSA

*Geosynthetic Cementitious Composite Mat

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Riverbank before work commenced

CCX-M™ installed with a boom and laid vertically

The edge of the CCX-M™ was pegged at the base of the anchor trench

The CCX-M™ overlapped every 1.8m and secured with 30mm screws

Once installation was complete, the CCX-M™ was hydrated

Hydration taking place

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*Completed erosion protection works*

Prior to the CCX-M™ being installed, the contractor created a 2m deep breakwater foundation at the base of the riverbed, supporting a 56° slope constructed from 1.2–1.5m diameter rock. Above this a 45°, 6m long slope was profiled and lined with CCX-M™ to provide erosion protection from subsequent flooding.

The CCX-M™ was installed with the aid of a boom truck and was unrolled and cut to the desired length by the operators. An anchor trench was excavated at the crest and toe of the slope into which the CCX-M™ was secured with 12mm thick steel pegs through each overlap. The subsequent layers of the CCX-M™ were overlapped by 100mm and joined using adhesive sealant, secured with 30mm screws in two zigzag rows every 50mm. Once the installation was complete, the CCX-M™ was hydrated. Finally, the toe trench was covered with rock giving greater weight to the CCX-M™ anchorage and backfilled with earth.

1,225m$^2$ of CCX-M™ was installed in 4 days by 10 people, with the works having to be completed before the first rains came into the area (which historically occur in mid-December).

*"The implementation of new alternatives in the stabilization of slopes in the DDV OCP marked a milestone in 2021 with the installation of the CCX concrete mat in the erosion of the Viche river bank in KP 43. It allowed us to save money and execution time , due to its rapid installation and the high resistance acquired by the concrete, guarantees low erosion in river floods.*

*The installation work was carried out easily by our workers in the sector, the product after 48 hours can withstand the flooding of the river. An efficient, effective and economically viable alternative."*

Ing. Cesar Cueva
**DDV-OCP West Coordinator, Ecuador**



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