




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 bank 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 Esmeraldas River. Heavy winter rainfall in the catchment results in increased flows in the Esmeraldas river causing damming of the Viche River, resulting in flooding and erosion. 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 interruption 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



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



Completed erosion protection works

Prior to the CCX-MTM 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-MTM to provide erosion protection from subsequent flooding.

The CCX-MTM 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-MTM was secured with 12mm thick steel pegs through each overlap. The subsequent layers of the CCX-MTM were overlapped by 100mm and joined using adhesive sealant, secured with 30mm stainless steel screws in two zigzag rows every 50mm. Once the installation was complete, the CCX-MTM was hydrated. Finally, the toe trench was covered with rock giving greater weight to the CCX-MTM anchorage and backfilled with earth.

1,225m² of CCX-MTM 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).

During a site visit in September 2022, the installation was found to be in optimal condition, considering that it has resisted 4 floods since December 2021 and is now going into its second rain season.

“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



Vegetation growth at the toe and crest of the bank installaton, CCX-M™ is still performing as expected



Vegetation growth at the toe and crest of the bank installaton, CCX-M™ is still performing as expected