

## Project Info



03 / 12 / 22



CCX-MAT™ (CCX-M™)  
Bulk Rolls



182m<sup>2</sup>



Transverse layers



Canal Chongon, Cerecita,  
Playas, Province of  
Guayas, Ecuador



Empresa Publica Del Agua  
(E.P.A) INNSOLUSA



To remediate an  
existing concrete canal,  
preventing further water  
loss and undermining.



INNOVANDO PARA EL DESARROLLO



Empresa  
Pública  
del Agua



Completed emergency remediation works

In December 2022, CCX-MAT™ GCCM\* (CCX-M™) was used as an emergency remediation solution for an existing concrete canal in Chongón - Cerecita - Playas - Ecuador. The existing canal had been built 25 years ago to channel raw water for purification in the cities of Playas and El Morro in the Province of Guayas, but to also provide irrigation to adjacent farms. The existing concrete had cracked with significant seepage losses causing undermining, erosion and collapse of the canal invert. Upon draining of the canal a 2m long by 1m wide hole was discovered. This hole resulted in water losses in the region of 50 liters/sec.

Due to the canal being an important source of water for both human consumption and the agricultural sector, the repairs had to be carried out in less than 24 hours - the maximum time in which the water service could be cut-off. Conventional concrete methods were not feasible due to the time constraints. The speed of installation, rapid hardening, abrasion resistance, low permeability and competitive cost of CCX-M™ ensured it was the most feasible remediation solution.

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 both soil and solid subgrades and was chosen for this project to suit the abrasion, and loading requirements.

Prior to installation, the existing canal had to be prepared by draining, clearing away debris and drying. The hole within the channel was then backfilled with compacted earth. Anchor trenches were excavated along each edge of the existing concrete canal profile.

\*Geosynthetic Cementitious Composite Mat







Water loss from hole in canal



Damaged concrete infilled with compacted earth



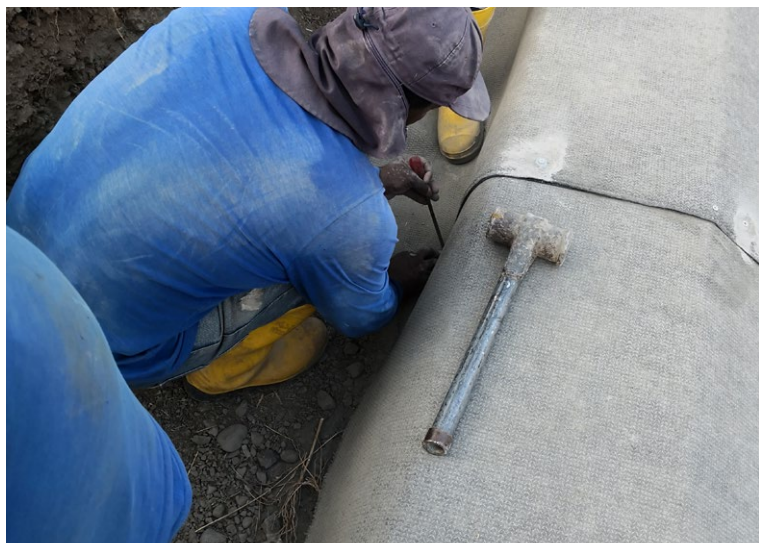
CCX-M™ deployed from flat bed truck and pulled across with an excavator



CCX-M™ thermally bonded using propane gas torch



CCX-M™ secured with short length stainless steel screws



CCX-M™ material secured using J-pegs within anchor trenches





Completed installation works

Once the canal was prepared, the CCX-M™ was mounted on a spreader beam and deployed from the back of a flat bed truck mounted with a crane. The CCX-M™ was then drawn off the spreader beam by an excavator positioned at the opposite bank of the canal. Once in position, the CCX-M™ was cut to the desired length and each layer was laid in the directional water flow, overlapping by 100mm.

The overlaps were sealed to ensure low permeability by thermally bonding with a handheld propane gas torch. Once thermally bonded, a 8mm Ø pilot hole was drilled at 500mm spacing, 50mm from the overlap edge, along the length of each overlap. The panels were then mechanically fixed to the underlying concrete subgrade with plug anchors and washers. Short screws were installed at 100mm spacing, 50mm from the overlap edge in between the mechanical anchors.

To prevent the CCX-M™ from being undermined by wind and water, the ends of each panel of CCX-M™ were secured within anchor trenches using galvanised steel J-pegs. Transverse upstream and downstream terminations were achieved by saw cutting a 100mm wide trench across the canal profile, approximately 100mm deep. The CCX-M™ edges were then folded into these trenches, mechanically fixed to the sides of the existing concrete, hydrated and backfilled with cementitious grout.

Two hydrations to saturation of CCX-M™ GCCM were performed within half an hour of each other. Upon completion of the hydrations, the side anchor trenches were backfilled and compacted. The CCX-M™ GCCM lining was allowed a day to cure and the canal was successfully reopened to operating conditions.

182m<sup>2</sup> of CCX-M™ was specified, with the installation work carried out by the client Empresa Publica Del Agua (EPA) with technical supervision provided by INNSOLUSA. The installation was carried out by 12 laborers and a machine operator in only 4 hours.

*“The concrete canal (Chongon-Cerecita-Playas Canal), this provides water for human consumption from 3 water treatment plants and water for irrigation as its main uses and benefits. This channel can be without supply for a maximum of 24 hours. Thanks to the GCCM technology, we were able to carry out the repair in the expected time.*

*The implementation time is less than that of traditional concrete, with lower cost. The results obtained were excellent, we solved the problem and at first glance it does not seem that this new technology had been implemented.”*

Ing. Ricardo Paredes Msg. –  
Gerente Técnico  
Gerencia de Operación y Mantnimiento  
Empresa Pública del Agua