

Concrete Fabric for Concrete Canal Lining Repairs

Investigating Concrete Cloth™ as a potential repair product

Research Bulletin
Science and Technology Program

S&T Project 19227

Concrete Cloth™ is a geosynthetic cementitious composite mat consisting of a bottom PVC membrane and a top fabric which is impregnated with a cementitious material that hardens once it has been hydrated. Concrete Cloth™ should be investigated as a rapid installation material to line existing unlined or cracked concrete linings to reduce seepage.

Mission Issue

Potential uses include re-lining existing unlined canals to reduce seepage for more reliable water deliveries.

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Problem

This scoping study investigated Concrete Cloth™ as a potential repair product for small spot repairs or as a lining for small canals to reduce seepage, outage time, and reduce construction costs. Reclamation needs repairs that can be performed underwater to reduce outage time. Rapid installation with a maintenance crew is also desirable to avoid large contracts involving a contractor.

Solution

This scoping study performed a desktop literature search to see how the product has been used in the past and if it can be used at Reclamation to repair our aging canals. Case studies provided by the manufacturer were studied which showed great potential for relining existing concrete canals or lining unlined canals that may have seepage problems.

The manufacturer also visited with engineers in the Concrete and Structural Laboratory where we discussed the advantages and limitations of the product. We also discussed material properties of the Concrete Cloth™ and other testing of the product that was either underway or needed further investigation.

The principal investigator (PI) also met with a local government who had been using concrete cloth to temporarily repair corrugated metal pipe which had corrosion damage at the bottom of the pipe. The PI discussed how they installed the product, details to seal the product to the metal pipe, time of installation, size of crews, and expected service life based on current performance.



Concrete Cloth™ used to repair corrugated metal pipe.

“The rapid installation and underwater applications have the potential to be very beneficial to canal linings in need of repair, but with little money for full replacement.”

Shannon Harrell, P.E.
Civil Engineer
Bureau of Reclamation

More Information

<https://www.usbr.gov/research/projects/detail.cfm?id=19227>

Application and Results

The major outcomes of this research are that Concrete Cloth™ is a viable product that should be investigated further by Reclamation. The manufacturer documentation indicates that this product can be installed underwater with a 2-hour working time. However, there were no case studies that could be found to show how this worked during installation and how it performed after. Underwater installation would be advantageous to Reclamation where taking a canal out of service is not feasible or will have an extreme negative impact.

Another major outcome is the potential of using this product to reline concrete canals that have minor cracks and need repair to reduce seepage. Concrete Cloth™ cannot bridge large voids or missing sections in the concrete liner, so the voids would need to be filled to provide a compact bearing surface for the Concrete Cloth™. Concrete Cloth™ should also be considered as a product to line existing unlined canals that have seepage loss.

Future Plans

The principal investigator plans to continue the study of Concrete Cloth™ through both laboratory studies and field studies. Laboratory studies would consist of determining mechanical properties related to abrasion, impact, and puncture testing and relating the results to other composite repair materials, fiber reinforced concrete, and unreinforced concrete. Further laboratory studies would include looking at the seepage potential of the concrete cloth vs. other Reclamation lining systems. And finally, performing a cost comparison on the different construction methods.

The Principal Investigator is also interested in doing a field study to investigate underwater applications as well as different environments such as freeze-thaw, debris buildup, expansive soils, high temperature, and high sulfates in the soils. Field locations should be low risk locations since the product is relatively new and there is still some question about the durability and longevity of the product.