

The use of GCCMs (Geosynthetic Cementitious Composite Mats) for lining Irrigation Canals as an alternative to conventional concrete.

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ABSTRACT

A new class of geosynthetic has recently emerged known as GCCMs (Geosynthetic Cementitious Composite Mats) defined by the ASTM D-35 committee in 2017 as 'a factory-assembled geosynthetic composite consisting of a cementitious layer contained within a layer or layers of geosynthetic materials that becomes hardened'.

GCCMs consist of a three-dimensional fibre structure filled with a dry cement/concrete mix, overlain by a hydrophilic filter layer and underlain by a watertight membrane, which is typically a PVC film. The material is delivered in its dry format and unrolled into place using similar installation techniques to traditional geosynthetics. Once in place, it is hydrated by spraying with water and the cement/concrete mix hardens. The result is a watertight polymeric film which is overlain by a protective fibre-reinforced concrete layer, with a thickness typically between 5 and 13mm thick.

GCCMs have been in use since 2009 and are predominantly used for the lining of water channels for small scale drainage. This paper explores their use as a potential lining solution for large scale irrigation canal structures by examining selected case studies from around the world.

The Bellavista Canal project in La Serena, Chile was implemented across two phases between July 2016 – February 2018. A GCCM was selected as an alternative to conventional concrete for channel lining to reduce water loss and provide a durable, hard-wearing, long-term solution that could be installed in a limited construction window. The canal serves the Bellavista Water Community, which relies on its water supply for irrigation of their crops.



Figure 1. Aerial view of a completed section of phase two installation at Bellavista canal