

## Project Info



20 / 02 / 18



CC8™ Batched Rolls



320m<sup>2</sup>



Transverse layers



Grand Western Canal,  
Tiverton, Devon, UK



Marine Civil Solutions



CC8™ used to line  
a drainage channel  
to reduce the risk  
of flooding from the  
adjacent canal



Completed CC lined channel

In February 2018, Concrete Canvas® GCCM\* (CC) was used to line a channel which runs adjacent to the Grand Western Canal, between residential properties and a Devon County Council owned jetty on Atherton Way, Tiverton in Devon, UK.

Upstream of the channel is a surface water network managing runoff from gullies, streams and field drainage which suffers from heavy silt build up. Downstream, a syphon under the canal conveys the flow to features such as ponds and streams. Due to the silt build up issue upstream, the channel capacity was reduced and prone to flooding, particularly during storm events.

Following a canal breach in 2012, it was determined that any potential flooding into the canal had to be prevented. To fulfill this brief, the 120m channel section needed to increase capacity to prevent flooding into the canal; prevent further erosion in high flows; and simplify maintenance methods.

Each of the 14 properties along the length of the channel had a bespoke bridge allowing them access to the jetty at the bottom of their property. In order to make works easier to manage, it was considered to remove each one and replace it when works were complete. However, costs meant they were left in place. As a result, a solution for the project was required which could accommodate the varying channel profile, existing infrastructure (namely the bridges), and would be a durable, long-term solution which could also minimise or simplify future maintenance requirements.

\*Geosynthetic Cementitious Composite Mat





Due to the nature of the site, accessibility for any form of maintenance or construction works was limited. All materials and equipment had to be brought in from the canal via barge. The nature of the channel base itself also provided complications as various sized stones and silt made it time consuming and difficult to dredge by hand without creating low spots and damaging the side slopes.

Marine Civil Solutions were awarded the project acting as lead contractor and planned to start works during the Spring of 2017. Unfortunately, due to swans nesting on the bank alongside the channel, works had to be postponed until January 2018.

The designs for the project were produced by Devon County Council's Engineering Design Group and agreed on by Southwest Water, Canal Team, Flood Risk Team and the Environment Agency. These designs specified that the channel should be excavated to a 1:200 gradient, with some sections to be widened to ensure the capacity of the channel was above that of the upstream 600mm culvert. CC was then specified to create a solid base for manual dredging and prevent erosion. Any voids behind the CC would be filled using concrete hessian bags, providing a solid fixing material that could be easily moulded into various shapes.



Existing channel in normal flow conditions



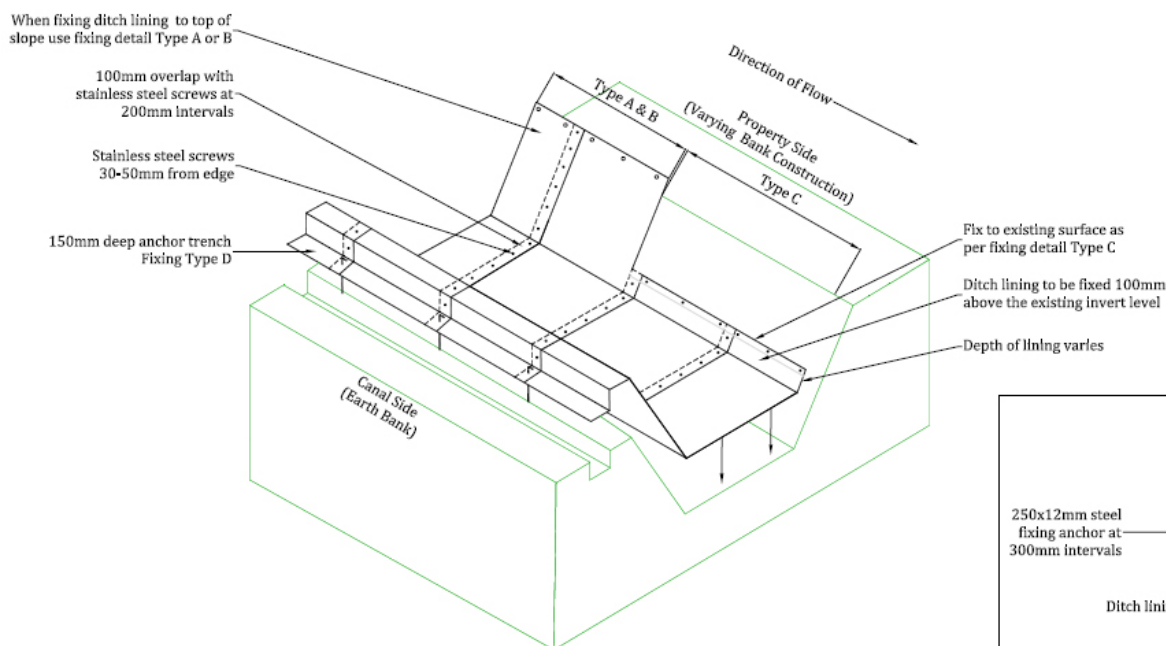
Channel in high flow flood conditions



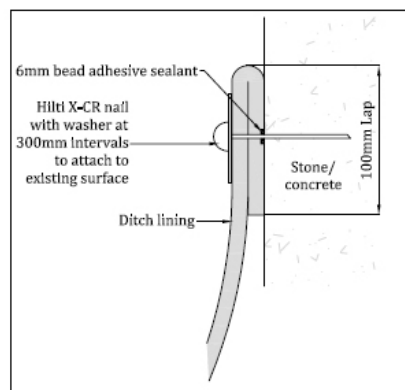
CC rolls transported by barge



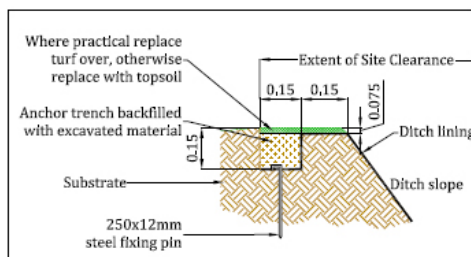
Channel cleaned for CC deployment



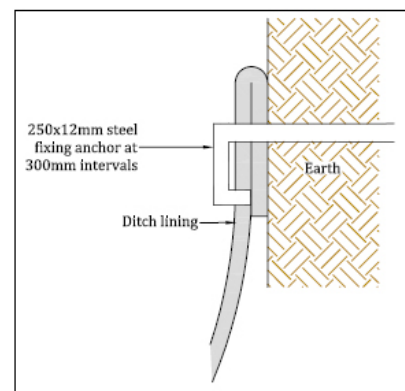
Ditch Lining Standard Detail  
Traverse Laying Method



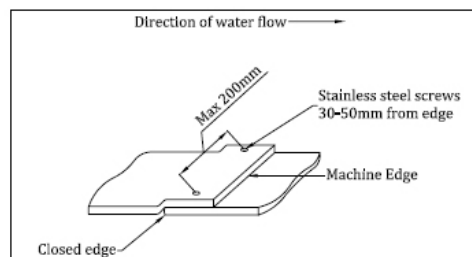
Stone/Concrete Fixing Detail - Type B and C



Trench Anchoring Details - Type D



Earth Slope Fixing Detail - Type A



Screwed Overlap Joint

## Design drawings for installation

A representative from Concrete Canvas Ltd. visited the site to advise the contractors on fixing methods. Due to the varying side slope materials (slabs, stone, masonry and wood), it wasn't possible to use the traditionally specified ground pegs on all sections. Instead, Hilti fixings, specialist resin and screws were used when fixing to anything but the earth bank.

Access to site for all materials was by barge. A loading area was designed by Marine Civil Solutions 200m away along the canal, where they could safely load and unload materials and moor up at the end of each day. CC was specified in batched rolls which are man-portable for easy transportation and use on restricted-access sites. The CC was cut to required length, secured using the respective fixings and jointed along overlaps, the material was hydrated until fully saturated.

The installation was carried out in 10-15m sections, while water was over-pumped from the channel at the area where works were being carried out. This ensured a constant flow of water downstream and minimised the impact on the canal. Contaminants were contained in the works area using hay bales which were inspected and replaced on a weekly basis. At the end of each day, the dam and pump were removed to allow water flow through the full length of the channel. Once installation was completed, all edges were grouted down and fixings checked.





*Works location along Grand Western Canal*



*Variable nature of channel materials*



*CC pinned under bridge structure*



*CC secured to masonry with anchors*



*CC installed prior to backfilling anchor trenches*



*Completed end section*





Completed channel with variety of anchor fixings and pipe penetrations

In future, upstream sediment management systems such as silt traps will be installed to prevent any future silt build ups and flood risks as less sediment should find its way into the ditch. However, for the time being, the Canal Rangers are now able to easily dredge the base of the CC lined channel to ensure sufficient capacity is maintained.

In total, 320m<sup>2</sup> of CC8™ was installed by a team of 3 over 5 days including preparation works. Despite the installation being carried out on a site with very limited and restricted access, CC batched rolls allowed the client to attain the results required in order to prevent further silt build up, flooding from the channel and reduced maintenance requirements, while also improving the long term performance of the channel.

*“The use of Concrete Canvas on this project has enabled us to reduce the risk of flooding from the adjacent canal and subsequently reduce the likelihood of future breaching. This would have been near impossible with conventional concreting methods. CC batched rolls allowed us to work around the access restrictions and easily transport the material on site. The groups involved are pleased with the outcome of the project, which has provided the required results to protect the canal and local residents for years to come.”*

**Karl Snell**

**Assistant Engineer, Highways – Area East Engineering Design Group, Devon County Council**