CONCRETE CANVAS®

CULVERT LINING

Project Info

- 03 / 09 / 18
- CC8™ Bulk Rolls
- 250m²
- Transverse layers
- Greatham Beck, Hartlepool
- Seymour Civil Engineering on behalf of AMCO
- CC used to provide a protective lining to a new culvert in a tidal stream

Completed CC-lined culvert structure in Hartlepool

In 2018, Concrete Canvas Ltd. were approached by Asset International Structures who were working with Opus International Consultants (WSP UK) for their client, AMCO-GIFFEN. The design of the structure was to the standard BD12/01and under clause 8.14 the provision of additional protection to the newly installed corrugated steel structure was required.

The Multiplate® was situated beneath an existing masonry railway arch and placed in a tidal stream known as Greatham Beck. A solution was required to provide the additional protection required under clause 8.14 from the tidal water. The client also required the solution to give the culvert structure the required 120-year life span. The works were carried out by water industry specialists, Seymour Civil Engineering of Hartlepool.

The location and site restrictions prohibited standard invert protection techniques, therefore, a practical, cost-effective solution was required. Asset International Structures suggested the use of a GCCM to Opus International and AMCO. The material would be used to line the invert of the culvert structure, extending above the normal high tide level for maximum protection. Asset International approached CC with their proposed solution, and together finalised a design which was approved by all parties.

CC8™ was specified to line the Multiplate® culvert structure as planned and, the combination of the material with the Multiplate® system provided the 120 year lifespan required by Network rail.

*Geosynthetic Cementitious Composite Mat

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In September 2018, works began. Following installation of the culvert, in accordance with CC's Four Key Principles of Installation, and as outlined in the design, the corrugations of the Multiplate® floor were filled with a ST4 concrete mix to give a smooth, void-free surface. The CC8™ material was then delivered to site and cut down to the required 9 linear metre lengths. These lengths were then wrapped around scaffold pipes, secured and transported into the culvert for deployment.

The installation crew then used sections of scaffold to help install the material above the horizontal termination at the securing plates pre-fitted to the culvert. The material was then secured to the culvert using Hilti shot fired nails and plastic washers. Different lengths of nail were used for the invert and culvert sides.

The material was then terminated using the termination bar designed by Asset. Once installed and hydrated, the material was used as a shutter and ST4 150mm slump concrete was poured down the back of the material to fill in any voids. A pencil vibrator was then used to remove any air gaps in the concrete mix.

Temporary dams were put in place during the installation to hold out most of the tidal water from Greatham Beck, however, the CC lining the culvert floor was hydrated with tidal water when the spring high tide topped the dams.

Inverts lined with concrete to support CC

Pre-cut layers transported on side using scaffold pole

Typical end tie in detail

Marking CC for Hilti nails on joints

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CC edges secured under pre-installed clamp bar supplied by Asset

Completed wall section of CC lined culvert

Hydration

End tie in detail: CC folded around culvert end and sealed with concrete mix

Completed culvert in use

Completed CC installation

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Completed installation

The installation of the 250m^2 of CC8™ material was carried out across several days due to the lack of access to the site during high tides. The installation was a success, with the collaborative approach to the project, and the specified CC8™ material resulting in all of the client's requirements being met.

The site was re-visited in June 2021, over two-and-a-half years after the installation was completed. The CC GCCM was found to be performing as expected despite signs of very high tides. The GCCM is also beginning to 'green' due to algae growth on its fibrous top-surface. The culvert and CC material will continue to be monitored periodically.

Return visit to Greatham Beck culvert site - CC is performing as intended and showing some signs of 'greening'

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