


Project Info


 01 / 08 / 17


 CC8™ Bulk Rolls

 2,000m²

 Transverse layers

 Muck Burn Flume,
Dumfries & Galloway,
Scotland, UK

 Cubby Construction
Ltd on behalf of
Scottish Power

 CC8™ was used to
remediate a dilapidated
concrete flume forming
part of a hydro-electric
system.



Completed installation at Muck Burn Flume

In August 2017, Concrete Canvas® GCCM* (CC) was used to remediate a dilapidated concrete flume forming part of a hydro-electric system in Dumfries & Galloway, Scotland.

The flume, known as the Muck Burn Flume, is a concrete culvert/aqueduct which was constructed in circa 1935 as part of the Galloway Hydro Scheme. The flume forms part of the Muck Burn Dam civil assets located near Loch Doon, which links to Drumjohn power station. The flume was created to divert flow from the muck burn to Loch Doon to prevent water build up behind the Muck Dam.

The flume structure principally comprises of an unreinforced concrete channel cast insitu. The flume is approximately 360m in length, and the base varies from 1.1m to 1.6m wide and the sides measure 1.6m, with the existing concrete 150mm thick.

A civil general inspection undertaken in June 2014 noted that the condition of the flume was poor in significant areas, and some localised repairs were carried out in 2015. The deterioration to the structure is consistent with erosion and frost damage. Rather than using conventional concreting techniques, CC was proposed to significantly mitigate the need for costly periodic repairs.

*Geosynthetic Cementitious Composite Mat



Water flow in original concrete flume



Algae, moss & vegetation growth within the flume channel



360m dilapidated concrete slabbed flume prior to installation



Vegetation & algae removed and water diverted out of the flume

Following the success of the CC remediation installation at the Bowburn Flume for Scottish Power in Scotland in October 2013, CC was specified for the Muck Burn Flume. Scottish Power commissioned works to design and construct remedial works to the flume and in August 2017, 2,000m² of CC was installed by Cubby Construction with design consultancy provided by A. L. Daines and Partners.

CC5™ had been specified at the previous Bowburn Flume installation, however, due to an increased level of silt and debris generated at Muck Burn, it was decided that the CC8™ would be the most appropriate material for this installation.

Prior to installation, the flume was pressure washed to remove vegetation and minor repairs were carried out using a semi-dry grout mix to fill any voids in the concrete to ensure intimate contact between the CC and the concrete substrate. The water flow was then diverted into a nearby channel by building an earthen dam and using sandbags. Bulk rolls of CC8™ were then delivered to site in staggered deliveries to reduce onsite storage and accommodate the speed of the installation crew. The bulk rolls were then mounted on a spreader beam, which was hung from a Komatsu PC210LC-7 Hydraulic Excavator.



First layers of CC being laid into anchor trench & overlaps marked



CC dispensed with a spreader beam & cut to length



Installing 34mm Hilti nails with 25mm washers



Inlet ditches lined with CC to direct bank runoff into flume



CC able to accomodate sharp bends



CC lined channel with corner & inlet channel detail



CC layers overlapped in the direction of water flow providing natural weep paths



Flume inlet with an anchor trench running across the width of the channel



Remediated flume lined with CC8™ transverse layers



Original Bowburn Flume 4 years after installation requires minimal maintenance

The CC was then rolled across the width of the flume before being cut to specific profile length with an angle grinder. Each length of CC was laid transversely, with adjacent layers overlapped by 100mm in the direction of water flow, and fixed in place using 34mm Hilti nails with 25mm diameter washers shot fired at centres not exceeding 600mm. Cubby Construction were extremely diligent in preparation and ensured the 100mm overlaps and 600mm Hilti spacing intervals were clearly marked in chalk prior to fastening to ensure the correct interval spacing.

In order to prevent any build-up of hydrostatic pressure between the original concrete slabs and the CC, the joints were left unsealed and free draining. These free draining joints create natural weep paths to allow water ingress into the flume. The end sections of CC were cut with an angle grinder post-set to provide a neat termination and any inlet areas with direct bank water runoff were either lined with CC or buried into an anchor trench. The CC material was hydrated after each day's work using a hose with spray nozzle attachment and a 6000L water carrier.



Completed Installation

2,000m² of CC8™ were installed in less than 3 weeks by 5 people, despite challenging weather conditions. The CC was able to easily accommodate sharp bends, junctions and inlet channels, along with interior and exterior pipe protrusions. CC also has a very low wash out rate and low alkali reserve meaning that it was not required to treat the run off from installation. The client was pleased with the speed and ease of installation, along with the long term erosion protection the CC material provides which will significantly reduce the costs for future maintenance repairs for the flume.

“Cubby Construction Ltd previously installed Concrete Canvas for Scottish Power at the nearby Bowburn Flume in 2013, so our installation crew were familiar with the material prior to installation. Despite the remote location and inclement weather conditions, we installed 2,000sqm of material in less than 3 weeks. The CC material had the ability to accommodate sharp bends and inlet channels, which helped with the speed of installation. The material could also be installed in wet weather, which helped reduce any down time on site and the project was successfully completed on time for the client.”

*Mike Rippon
Commercial Manager,
Cubby Construction Ltd.*