



CONCRETE CANVAS® Concrete on a Roll

UTILITIES CASE STUDIES



RAIL



ROAD



MINING



PETROCHEM



AGRO



PUBLIC WORKS



UTILITIES



DEFENCE



DESIGN



SHELTER

Project Info



29 / 06 / 15



CC5™ Bulk Rolls



840m²



Transverse layers



Casterino, France



Garelli Industrie,
Chantier



CC5™ used to line a temporary diversion channel as part of maintenance works on a hydroelectric scheme.



CC lined diversion bank showing stages of hydration

In June 2015, Concrete Canvas® GCCM* (CC) was used to line a temporary diversion channel at a construction site in Casterino, France. Intended to be in operation for two months, the lined channel was designed to re-direct flow from an existing hydroelectric scheme whilst critical maintenance works were being conducted. The work was carried out by GARELLI I.E.S (Industrial & Environmental Services) with input from French distributor, Point P Travaux Publics.

CC was chosen due to its rapid installation rates compared to more conventional methods. CC's other, main advantages over conventional concrete are ease of install, cost savings, durability and environmental friendliness.

Prior to installation, any loose material and rocks were removed, the channel graded and anchor trenches excavated. The CC was delivered to site in bulk rolls, and cut to profile length using hand tools. The CC was laid transversely across the channel, with layers overlapping by approx. 100mm, and fixed to the substrate using steel pegs. The overlaps were then joined using screws at 200mm intervals. Following installation, hydration was given via water tank and hose.

In total, 840m² of CC5™ was installed over three days, by a team of four. The customer was very satisfied with the end result and particularly impressed by the rapid installation times.

*Geosynthetic Cementitious Composite Mat





Diversion site prior to excavation



Deployment of CC5 bulk rolls via spreader beam equipment



Completed lined diversion.

Project Info



12 / 09 / 16



CC13™ Bulk Rolls



350m²



Transverse layers



Dawes Lane, Scunthorpe.



TK Gallagher Ltd.



To provide a rapid method of offering a protective cover to National Grid's key gas mains.

nationalgrid

GALLAGHER



The objective was to provide a rapid method of protective cover to a National Grid key gas main

In September 2016, Concrete Canvas® GCCM* (CC) was used to line a channel at Dawes Lane, Scunthorpe. The objective was to provide a rapid method of offering a protective cover to a National Grid key gas main that had been identified to have a shallow cover, therefore falling outside of the required specifications. The works were carried out by TK Gallagher Ltd for, and in conjunction with National Grid.

Prior to installation, the site had to be cleared of all vegetation, including a large tree which had to be cut back substantially. An existing flume and debris also had to be cleared; the ground was then graded with a digger bucket to give a smoother surface ready for installation. Anchor trenches were cut into the shoulders of the channels ready to receive the CC13™ Concrete Canvas material which was delivered to site in bulk rolls.

The CC was unrolled, cut to profile width to minimise waste using a petrol disc cutter, and laid transversely across the channel with layers overlapping by 100mm. The CC was then fixed to the ground using ground pegs through the overlaps and within the anchor trenches. The overlaps were also jointed using stainless steel screws at 200mm intervals, before hydration of the Concrete Canvas. Following hydration, the anchor trenches were backfilled to prevent future ingress of water between the CC and the substrate.

In total, 350m² of CC13™ was installed by the Gallagher during the project. This scheme was part of ongoing work by National Grid (East Midlands region) on the protection of key strategic gas pipelines which have been identified to have shallow cover.

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CC13™ Bulk Rolls



Channel prior to removal of flume and de-vegetation



Profiling of the channel via plant machinery



CC bulk rolls deployed via spreader beam, transversely across channel



Fixing CC layers to substrate using plastic pins to comply with NG regulations



Hydration

Project Info



01 / 10 / 13



CC5™ Bulk Rolls



7500m²



Transverse layers



Bowburn Flume,
Dumfries, Scotland



Cubby Construction
on behalf of
Scottish Power



CC5™ used to
remediate a dilapidated
concrete flume forming
part of a hydro-electric
system.



Completed installation at Bowburn Flume, Dumfries

In October 2013, Concrete Canvas® GCCM* (CC) was used to remediate a 1.5km concrete flume, forming part of a hydro-electric scheme operated by Scottish Power, in Dumfries and Galloway, Scotland. The works were carried out by Cubby Construction with design consultancy provided by A. L. Daines and Partners.

Inspections of the flume found that there were several areas in real need of refurbishment, while the whole length had algae, moss and grass growth covering the top surface. There was also a substantial build-up of gravel and detritus at certain locations and the condition of the concrete panels were variable. Traditional options previously used had included sprayed concrete and the removal and replacement of existing concrete sections. However, CC was proposed to significantly mitigate the need for costly periodic repairs and maintenance.

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 large voids in the existing concrete. Bulk rolls of CC5™ were delivered to site and cut to specific profile lengths. Each length was laid transversely and fixed in place using 34mm Hilti nails with 25mm diameter washers shot fired at intervals of 600mm. Layers were overlapped by 100mm in the direction of water flow. Once hydration was given, the ends of the CC were cut with an angle grinder post-set to provide a neat finish.

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The site was in a remote location



The existing concrete channel was damaged and overgrown



Hilti screws and washers were used to fix the CC to the concrete



Completed installation

The CC was installed over a 6-week period at a rate of up to 600m² per day in inclement weather and in a remote location. The performance of the CC will be reviewed by half-yearly inspections of the flume in relation to abrasive nature of the water on the CC. The use of CC allowed Scottish Power to line the entire length (1500m) of the flume encasing all the concrete defects, thus negating the requirement to carry out concrete repairs every 2 years.

"It was our first experience of installing Concrete Canvas but we were impressed with the ease and speed of installation, particularly given the challenging conditions on a remote site. In particular, the ability to install in wet weather greatly reduced down time that we would have normally experienced with traditional methods."

Mike Rippon
Commercial Manager, Cubby Construction Ltd.

Project Info



01 / 08 / 13



CC5™ Bulk Rolls



190m²



Transverse layers



Scottish Borders,
Scotland, UK



Castle Group Scotland



CC5™ used to
remediate a dilapidated
ARMCO culvert.



Completed culvert installation

In August 2013, Concrete Canvas® GCCM* (CC) was used to reline an ARMCO steel corrugated pipe which formed part of a culvert on the Scottish borders.

The existing 1–2mm bitumen coating had degraded due to erosion and weathering, resulting in an increase in silt, debris and vegetation growth within the culvert. Installing a new culvert would be costly and would involve temporary lane closures of the nearby A7 trunk road, while re-spraying culverts with bitumen is now generally prohibited by the Scottish Environment Protection Agency (SEPA) due to the potential for environmental damage, and any remediation solution would need SEPA approval. Glass Reinforced Plastic (GRP) was also considered, but this would have to be specially made, leading to increased cost and lead time. CC was chosen due to its speed of installation, its ability to easily accommodate changes in culvert profile and its minimal environmental impact.

Prior to installation, the ARMCO pipe was cleared of any silt and other debris and the damaged bitumen lining removed using a pressure washer. A semi-dry grout mix was then applied to fill in the corrugations before bulk rolls of CC5™ were delivered and cut to length on site, ensuring minimal wastage. The CC was laid transversely, overlapped by 100mm in the direction of water flow and fixed at 200mm intervals using stainless steel screws before being hydrated.

In total, 190m² of CC5™ was installed in a week and a half. Castle Group Scotland were impressed with the ease and speed of install, and its minimal environmental impact and increased lifespan compared to bitumen.

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Flow erosion had caused the existing bitumen lining to break down



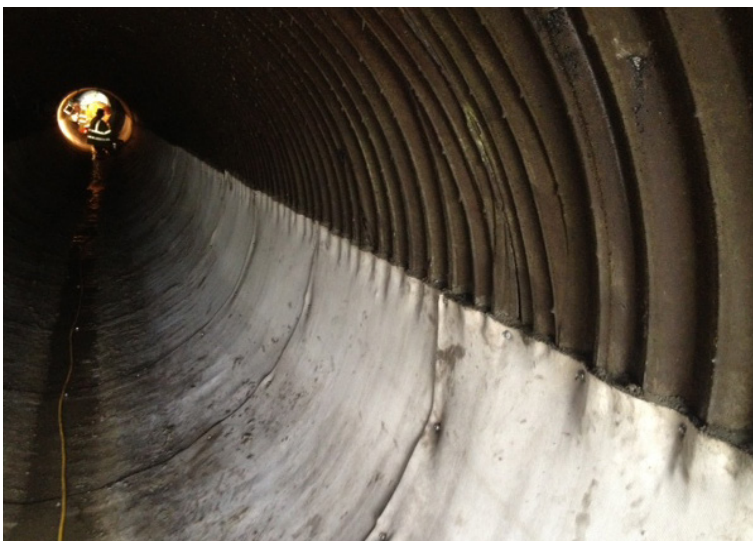
The culvert was pressure washed to remove the degraded bitumen



Semi-dry grout was applied to fill in the corrugations in the ARMCO pipe



CC5™ was applied in transverse layers inside the culvert



Stainless tech screws were used to fix the CC8 to the pipe



Relined culvert section

Project Info



01 / 10 / 13



CC8™ Bulk Rolls



675m²



Longitudinal layers



Northampton, England, UK



Moulding Contracts Ltd.



CC8™ used to protect two bank sections of a tertiary landfill lagoon.



Completed installation

In October 2013, Concrete Canvas® GCCM* (CC) was used to protect two sections of bank that are part of a Dredging Waste Temporary Storage Area (DWTSA) at a landfill site in Northampton.

The DWTSA lagoon was constructed on the in-situ low permeability clay, which provides secondary containment to the engineered containment structure. The life of the DWTSA is limited because the site will eventually be excavated to create a landfill void. CC was specified due to the risk of erosion through tipped debris and minor maintenance traffic. Furthermore, it will be easier to de-construct and provide a lower mass of material to recover at the end of the lagoon's life compared to in-situ concrete. The work was carried out by Moulding Contracts Ltd. for Augean South with input from the Environment Agency (EA).

Prior to installation, the clay substrate was excavated across an area of approx. 41m by 76m at ground level to a depth of approx. 4.5m, providing a holding capacity of around 5000m³. CC8™ was then installed on the southern section, and part of the eastern section of the lagoon slopes, as filling and emptying will only be carried out from these areas. The CC was laid vertically down the slopes, anchor trenched at the toe and mortar joined at the crest to a concrete loading platform. Metal peg fixings were used at regular intervals to fix the CC along its length. Once fixed, the CC was hydrated.

In total, 675m² of CC8™ in bulk roll format was installed in 5 days by Moulding Contracts Ltd.

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Corner detail



Metal fixings attaching the CC8™ to the clay substrate



Anchor trench at the toe of the bank



Mortar joint



The finished installation

Project Info



10 / 08 / 16



CC8™ Batched Rolls



150m²



Transverse layers



Widdop Reservoir,
Hebden Bridge, Yorkshire,
UK.



J N Bentley / Mott
MacDonald Bentley



CC used to provide
protection to a
drainage channel at
a reservoir in Yorkshire



Completed installation at Widdop Reservoir

In August 2014, Concrete Canvas® GCCM* (CC) was used to line a drainage channel at Widdop Reservoir in Yorkshire, UK. CC provided cost savings compared to conventional concrete solutions given the speed of installation in a remote, limited access location. The works were carried out by Contractors J. N. Bentley on behalf of the consultant Mott MacDonald Bentley for Yorkshire Water.

The reservoir was drawn down, but the channel that normally discharged into the spillway also needed attention. It was decided that a temporary channel would be constructed between the by-wash channel and the reservoir itself, before constructing a stank to divert the flows. The original temporary works design called for the channel to be lined with 250mm thick concrete with a layer of reinforcing mesh. With limited access to the location, CC was specified and delivered in pre-cut batched rolls which can be manually transported on site.

Prior to installation, a temporary flume was built to enable a digger to access the other side of the drainage channel. The wall of the channel was left in place while it was excavated, but was then removed and the stones were marked and kept ready for rebuilding the wall following installation. The CC was laid transversely across the channel with layers overlapped by 100mm and fixed with screws and washers. The edges of the CC were then buried in pre-dug anchor trenches which were then backfilled. Hydration was given via sump pump using water from the temporary dam.

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The channel was excavated before installation began



The CC was laid transversely



The CC edges were buried in pre-dug anchor trenches



Completed installation

In total, 150m² of CC8™ was installed in clear, sunny weather in just one day. The use of CC meant a 67% reduction in labour costs, utilising 28% of staff that would ordinarily be required when using a conventional alternative.

Overall, the contractor was very impressed with the speed of installation compared to poured concrete which was the only other method considered for this project. The lack of requirement for large equipment on site meant no additional approvals from Yorkshire Water were needed, which helped with the speed of the project.

“The product worked well and is especially worth considering for temporary works applications in hard to reach locations as an alternative to in-situ concrete.”

**Tom Lewis,
Operations Manager,
J N Bentley**

Project Info



16 / 02 / 17



CC8™ Batched Rolls



20m²



Transverse layers



Tattenhoe, Milton Keynes,
UK



Barhale



Provide scour and
erosion control beneath
an outfall.



Completed Concrete Canvas scour protection

In February 2017, Concrete Canvas® GCCM* (CC) was used to provide scour and erosion control beneath an outfall near a housing development at Tattenhoe, Milton Keynes, UK. An existing headwall had collapsed into the river due to scour erosion caused by storm flows from an outfall pipe. Heavy rainwater flows eroded the vegetated bank further which caused the final section of pipe to collapse into the channel. The solution was to regrade the existing slope and install a robust erosion control solution to prevent scour of the reinstated area. CC was specified as the ideal choice due to the speed and ease of install on a steep slope. The works were carried out by Barhale as part of Anglian Water's IOS Alliance.

The installation took place in dry weather, but the ground was very damp and muddy, making working conditions more difficult. Prior to installation, vegetation was removed from the slope with an excavator, then re-graded, and anchor trenches dug by hand. The CC was laid horizontally, fixed with 250mm steel pegs at 1m intervals, jointed with stainless screws at 200mm centres and grouted around the existing pipe. The edges of the CC were then captured in the anchor trenches, which were backfilled by hand. The CC material was hydrated using water pumped directly from the stream.

In total, 20m² of CC8™ were installed in just 1 hour and 15 minutes by 3 people. The speed and ease of installation made this project a success. This installation is now being used as part of Anglian Water's business case for the use of CC, and they hope to be able to use the material for similar applications in future.

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CC8™ was delivered to site in bulk rolls



The CC was laid horizontally, working up the slope



The CC was fixed along the overlaps using screws



Grout was used to seal the CC around the existing pipe



Hydration of the CC from local water course



Completed installation

Project Info



01 / 12 / 10



CC5™ Bulk Rolls



10m²



Longitudinal layer



Goldhanger, Maldon, Essex, UK



Environment Agency (EA)



CC5™ was trialed to inhibit weed growth beneath a set of steps used by EA operatives to gain access to sluices and pumping stations



Completed installation



The steps prior to installation



The batched CC was unrolled underneath the steps



The CC was fixed using screws and hydrated

In December 2010, Concrete Canvas (CC) was trialed to inhibit weed growth beneath a set of steel seawall steps. The steps provide Environment Agency (EA) operatives safe access up/down their seawall embankments to structures such as sluices and pumping stations.

The steps have an open tread mesh which allowed grass to grow up from beneath, meaning that additional maintenance was required to keep them clear from obstructions. The grass and vegetation below the steps could not be removed using strimming equipment and herbicides were discounted as many of the seawalls that the stairs gave access to were environmentally designated sites (SSSI, RAMSAR, SPA, SAC etc.) and had nearby water. The decision was reached that the best way to prevent grass growth was to suppress the area beneath the stair access. A layer of geotextile or filter canvas was considered but it was thought that this would degrade in UV and wouldn't provide a long term solution. CC5™ was chosen instead for its durability and protection from weathering and UV degradation. The CC was installed quickly, by removing several of the step treads, slotting the edge of a batched roll below the steps and unrolling it down the embankment. This was advantageous as the steps did not have to be fully removed, which saved on time and did not require plant equipment. The CC was then fixed using screws, and the EA were also able to take advantage of the borrow dyke channel behind the seawall to collect water for hydrating the CC.

In total, 10m² of CC5™ was installed on the site with considerable time and cost savings made. The project was considered a success and plans are being considered to apply CC to a number of other seawall step sites.

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