



CONCRETE CANVAS®

Concrete on a Roll

ROAD CASE STUDIES



RAIL



ROAD



MINING



PETROCHEM



AGRO



UTILITIES



PUBLIC WORKS



DEFENCE



DESIGN



SHELTER



Winner
Technical Innovation Award

ice
Institution of Civil Engineers

award winner
2017

ICE Wales Cymru Project Awards



2014 Fast Track 100
16th fastest growing
company in the UK.



2014 Queen's Award
for Enterprise in
Innovation



2013
Macrobert Award
Finalist



2013 Innovation Award Winner
Railtex Exhibition



2012 R&D 100
Award winner
R&D Magazine



2009 Winner
Material Connection Medium Award
Material of the Year

Material Connection
MEDIUM AWARD
MATERIAL of the YEAR



D&AD Yellow Pencil Award
Winner
Product Design

Project Info



16 / 02 / 15



CC8™ Bulk Rolls



1,800m²



Transverse layers



A38 Drumbridges
Roundabout, Heathfield,
Devon, UK



Balfour Beatty



CC8™ was used to line
a roadside channel with
a high flow rate.



Completed installation

In February 2015, Concrete Canvas® GCCM* (CC) was used to line a 1.5m deep and up to 4m wide channel next to the A38 Drumbridges Roundabout, Heathfield, Devon, UK. The ditch had to be moved from its original location to allow for a dedicated left turn lane to be added to the roundabout. The channel needed to be low maintenance and able to cope with the high flow rates that occur during the wetter months of the year. Conventional concreting methods were considered, but they would have delayed the programme of works as they cannot be installed in wet conditions. The works were carried out by Balfour Beatty Regional Civil Engineering for Highways England.

The ditch was excavated and any vegetation or loose rocks removed, with some sections of the ditch requiring the construction of sandbag walls which were later backfilled. Bulk rolls of 8mm thick CC (CC8™) were supplied in called off deliveries to minimise on-site storage. A spreader beam hung from plant was used to deploy the bulk rolls into the ditch, where they were cut to specific profile length using a disc cutter. Pegs were inserted through every overlap at the shoulders of the ditch before the overlaps were jointed using an auto fed screwdriver, with screws placed at 200mm centres. Pipe penetrations were easily accommodated by cutting a hole in the CC and fixing it around the pipe. Hydration was achieved using a bowser and hose combination.

In total, 1800m² of CC8™ were installed in a live water course and during inclement weather. The speed of installation allowed work to start on the new traffic lane much faster than if conventional concrete had been used. The CC will also eventually green over and provide a more natural looking finish.

*Geosynthetic Cementitious Composite Mat





Old ditch (left) and new ditch (right)



Sandbag retaining wall



Unrolling the CC



Cutting the CC



Pegs were inserted through the overlap



The CC was jointed with screws

Project Info



11 / 12 / 13



CC8™ Bulk Rolls



4,250m²



Transverse layers



A465 (Brynmaur), Wales, UK



Carillion for the Welsh Government



CC8™ used to line drainage channels as part of a Highways Agency road widening scheme



Completed installation

In December 2013, Concrete Canvas® GCCM* (CC) was used to line drainage channels along a 7.8km stretch of the A465, between Brynmaur and Tredegar in South Wales. The channels form part of the A465 Duelling Project, part of the National Transport Plan which will contribute to upgrading links to businesses and communities and improving safety.

Commissioned by the Welsh Government, the scheme is under Highways Agency management with Carillion as main contractor, supported by Walters UK who were to complete the principle earth works and pre-earthworks drainage. ARUP provided the design detail which specified CC. Stone pitching with a paving slab invert was also considered, but this would have resulted in a considerably longer installation time, further delayed by weather conditions.

CC8™ was used to line one main channel and various smaller channels on site. The main channel was approximately 250m in length, 7m wide at the crest and 3m wide at the base. Bulk rolls were deployed using an excavator and spreader beam before the CC was batched to length using hand tools. The layers were laid and overlapped by 100mm in the direction of water flow and screwed into place at 150mm intervals.

The CC8™ was installed at a rate of approximately 50m² per day by a 3-man team, with a total of 4,250m² of CC8™ laid during the project. CC8™ provided a significantly faster and easier installation than conventional options, which would have to be put on hold in poor weather conditions.

*Geosynthetic Cementitious Composite Mat





The ditch was excavated and graded to profile



Plant was used to unroll and place the material



Transverse layers with a 100mm overlap were screwed in place



Hydration of CC8™ via bowser and petrol pump



Transverse layers backfilled into the anchor trench along crest



Completed installation

Project Info



05 / 02 / 2016



CC8™ Bulk Rolls



750sqm



Longitudinal vertical layers



Wadi Laban, Riyadh Saudi Arabia



DNGO Saudi Contracting Company



Prevent rain water run-off infiltrating a gulley and causing a land slip.



Completed, painted installation

Concrete Canvas® GCCM* (CC) was used to prevent rain water run-off infiltrating a gulley and causing a land slip at Wadi Laban, Riyadh Saudi Arabia, in February 2016. Concrete and shot-crete were the considered alternatives but would not have been as cost effective compared to using CC, also taking a significantly longer time to install. The work was carried out by FOQSCO - Freih Bin Owaidha Al-Qahtani Sons Co. LTD for DNGO Saudi Contracting Comany.

The weather was mainly dry with intense sunshine. The temperature was moderate as this installation was carried out during the winter months. Pre-installation preparation included removing loose gravel and sharp rocks from the surface, levelling of uneven areas and a single layer of geotextile being laid.

The CC was laid longitudinally using a spreader beam and crane then subsequently cut to required lengths. Once laid, the CC was fixed on the sides by drilling holes and the use of 200mm rock bolts. Multiple layers of CC were jointed using 19mm stainless steel screws, screwed at 50mm centers. The Concrete Canvas was anchor trenched at the top and backfilled with concrete. Hydration was carried out by using a hose attached to a tanker over the course of three days due to the dry weather conditions.

After installation the CC was hydrated for 2 hours and then rehydrated further after 2 hours, then again 2 hours later due to the prevalent dry conditions and the steep nature of the slope. The same hydration process was repeated the next day. Once set, the CC was painted with a client specified colour to blend in with the natural landscape of the surrounding area.

*Geosynthetic Cementitious Composite Mat





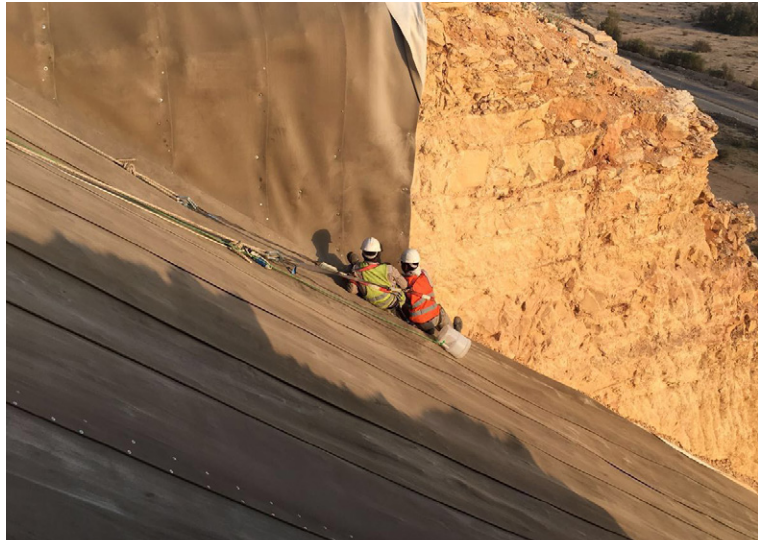
The slope before work



The slope prior to CC install



A geotextile was laid prior to installation of the CC



Contractors fixing the CC with bolts & pegs to the slope at 50mm centers



Hydration taking place



A 5,000 gallon water tank was used for hydration



The set CC8™



The slope after being painted for Aesthetics

The installation took 27 hours in total, over a course of 3 days. The project was a great success with the client being so satisfied, wishing to use CC again in the future.

Using CC was far quicker than using shotcrete, which would have also been much more difficult to work with, allowing the team to continue work in other areas of the site simultaneously while not raising any dust or causing issues with splash back. There was a large cost saving by using CC over more conventional methods due to the rapid and easy installation.

“The client was very happy. They would like to use it again and recommend CC to anyone who has similar requirements.”

**Project Manager
FOQSCO.**

Project Info



01 / 02 / 16



CC8™ Bulk Rolls



1,250m²



Transverse layers



M32, Bristol, UK



Graham Construction



CC used to provide erosion protection to near road side drainage channel on M32

GRAHAM

CONSTRUCTION



Completed installation

In February 2016, Concrete Canvas® GCCM* (CC) was used to line a drainage channel at the side of the M32 motorway in Bristol. The installation was part of construction works for a new bridge designed for bus-only traffic and the MetroBus scheme, a series of major improvements to the transport network by Bristol, South Gloucestershire and North Somerset Councils which aimed to ease congestion and improve public transportation services.

An existing channel was designed to accommodate surface run-off from the adjacent field and Purdown Hill. However, this had to be realigned to accommodate the new slip road. CC was chosen for this project due to its quick installation times, ability to be installed in wet conditions, and the reduction of disruption to traffic. The works were carried out by Graham Construction.

The existing poured concrete channel was removed and the new section was excavated using plant and v-bucket. The base was then scattered with aggregate before the CC was laid across the width of the channel and cut to size using a disc cutter. The CC was overlapped in the direction of water flow by 100mm, and screwed together at 200mm intervals. The outside edges of the CC were then secured in anchor trenches using 200mm steel ground pegs and backfilled.

In total, over 1,250m² of CC8™ was installed in under 8 days by eight people in inclement weather. The project saved time, money and avoided significant traffic disruption and unnecessary lane possession.

*Geosynthetic Cementitious Composite Mat





Channel before preparation



All vegetation and debris was removed before installation



Power tools were used to cut the CC



Steel pegs and screws were used to secure the CC



Hydration taking place



Completed installation and the surrounding area

Project Info



30 / 08 / 16



CC5™ Bulk Rolls



500m²



Longitudinal/Vertical layers



Highway A24,
Nó da Régua,
Peso da Régua, Portugal



Rodio Portugal SA



Protection and
stabilisation of a slope
next to Highway A24,
joining on to existing
concrete infrastructure.



Installation of CC at Highway A24, Nó da Régua

In August 2016, Concrete Canvas® GCCM* (CC) was used to protect two slopes at Highway A24, Nó da Régua, Peso da Régua, Portugal. Part of each slope had been previously lined using conventional concrete methods, however, for more effective, long-lasting protection, an alternative was required. Shotcrete was considered, but the rebound would have required highway lanes to be closed. As a result, CC5™ was chosen for the installation.

In preparation for installation, vegetation and large rocks were removed, and the CC was mounted onto a spreader beam and hung from a truck crane stationed at the base of each slope. The rolls were then unrolled from the top of the slopes, with the team ensuring an overlap of 100mm between layers. The CC was attached to the existing concrete with masonry screws, the CC was then fixed at the crest with 380mm screws down the face of the slope, with every alternate screw closer to the edge. The material was hydrated and then re-hydrated an hour later due to high temperatures. In total, 480m² of CC5™ was installed by 4 people in under 3 days.

“The advantages of CC are] the simplicity in application; the industrialization of the application process; the speed on installation; the non-risk of over hydrating the concrete; the low safety risks associated; the easiness on the material transportation; and finally, the reduced industrial waste resulting from the application.”

Carlos Costa
Lead Engineer, Rodio Portugal SA

*Geosynthetic Cementitious Composite Mat





CC was craned from the base of the slope to the top on a spreader beam



CC was attached to existing concrete with masonry screws



The team ensured an overlap of 100mm during deployment



Every other screw was closer to the edge, forming a triangular pattern



Hydration of the taking place



Completed installation

Project Info



15 / 07 / 13



CC5™ Bulk Rolls



1,000m²



Longitudinal/Vertical layers



Zipaquira-Bogotá Highway, Colombia



Undisclosed



CC5™ used as an erosion control measure in order to protect Zipaquira-Bogotá highways from a washout of fines and other debris.



Completed installation



Slope prior to installation



CC secured using screws and steel ground pegs



CC tailored around existing infrastructure

In July 2013, Concrete Canvas® GCCM* (CC) was used as erosion control on a slope at the side of the Zipaquira-Bogotá Highway in Chinchilla, Colombia.

The slope had suffered landslip and erosion due to adverse weather conditions, exacerbated by a leak from a water pipe installed across the slope. There was potential for falling debris to cause an accident on the highway or block the path below, and so an urgent solution was needed. Shotcrete had been considered for the project, but rebound could cause damage to the highway and surroundings.

In preparation for installation, vegetation and debris were cleared and the CC5™ bulk rolls were delivered to site and cut to length to eliminate wastage. The CC was then fixed to the top of the slope using 400mm steel ground pegs, unrolled down the slope using a spreader beam and climbing equipment, and overlapped by 100mm and screwed in place at intervals of 200mm. Anchor bolts were then used to fix the material to the foot of the slope before hydration.

A total of 1,000m² of CC5™ was installed in 13 days in inclement weather by a team of 6. The client and installation team were impressed with the ease and speed of install and the material's "consistency and functionality".

*Geosynthetic Cementitious Composite Mat



Project Info



01 / 03 / 15



CC5™ Batched Rolls



160m²



Vertical layers



Hachioji City, Tokyo,
Japan



KOSOKU HOZEN
Co. Ltd



CC5™ was used to
protect a slope at risk of
slip due to weathering
erosion.



Completed installation



A pulley system was used to deploy the CC



U-shaped steel pegs were used to fix the CC



Completed installation

In March 2015, Concrete Canvas® GCCM* (CC) was used as slope protection in Hachioji City, Tokyo, Japan. The slope was at risk of landslip due to weathering erosion.

The site had access issues due to the proximity of the tree-line at the crest and no plant access at the toe. Shotcrete was initially considered, however the rebound and access issues made it unsuitable, and therefore, CC was chosen instead. The work was carried out by KOSOKU HOZEN Co. Ltd for Central Nippon Expressway.

The contractors began by removing any vegetation and sharp or protruding debris from the slope face. A pulley system was then set up to deploy batched rolls of CC5™ down the face of the slope, and each layer was then fixed to the substrate using rock anchors or U-shaped steel ground pegs, where applicable. Layers were overlapped by 100mm which were jointed with screws prior to hydration.

A total of 160m² of CC5™ was installed in 6 days by a team of five people. The CC5™ was able to easily accommodate the varying profile of the tree-line and was easy to install despite the limited site access. The contractor was impressed with the CC and will consider using it on other projects.

*Geosynthetic Cementitious Composite Mat



Project Info



18 / 09 / 13



CC5™ Bulk Rolls



200m²



Vertical layers



Taupiri,
New Zealand



Fletcher Construction



CC used as an capping layer over a geogrid to prevent erosion of a bridge abutment.



Completed installation

In September 2013, Concrete Canvas® GCCM* (CC) was used as an erosion control solution on a section of bridge abutment in Taupiri, New Zealand. The CC was installed as a capping layer to an existing geogrid system. Shotcrete was initially considered for the project, but would require specialist equipment and labour, as well as extending the installation time. As a result, CC5™ was chosen instead. The works were carried out by Fletcher Construction in conjunction with Brian Perry Civil and PC Environmental.

Bulk rolls of CC5™ were delivered to site and cut to size to fit the varying height of the slope, ensuring there was no wastage. Using a rough terrain cherry picker and spreader beam, each length was then lifted to the top of the slope and fixed in place using 300mm steel pegs. This was more challenging in sections directly under the bridge, where the CC was fixed at the toe of the slope first. The layers were overlapped by 100mm and screwed together with 30mm screws at 200mm intervals using an auto-fed screwdriver prior to hydration.

Fletcher Construction were very impressed with the ease of installation, and project time was considerably reduced in comparison to conventional concrete methods. A total of 200m² of CC5™ was installed in just over 5 hours by a team of three people. Had shotcrete been used, the project would have taken 1-2 days.

*Geosynthetic Cementitious Composite Mat





Site before installation



CC was cut to length on site to match length of each slope section



A cherry picker was used to assist during installation



CC was jointed using 30mm screws



Hydration of the CC installation



Completed installation