



CONCRETE CANVAS®

Concrete on a Roll

USER GUIDE: GENERAL



RAIL



ROAD



MINING



PETROCHEM



AGRO



UTILITIES



PUBLIC WORKS



DEFENCE



DESIGN



SHELTER



The Queen's Awards
for Enterprise:
International Trade
2019



Board of Trade
Winner
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Winner
Technical Innovation Award



Innovation Award
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Concrete Canvas® is part of a revolutionary new class of construction materials called Geosynthetic Cementitious Composite Mats (GCCMs). It is a flexible, concrete filled fabric that hardens on hydration to form a thin, durable, water proof and fire resistant concrete layer. Essentially, it's concrete on a roll. The following guide provides useful information for installers, customers and specifiers of Concrete Canvas® GCCM (CC) and provides an overview of technical data, applications and properties of the material. The versatile nature of CC means that this document is not exhaustive and is intended for guidance purposes only.

1.0 Specification

1.1 Concrete Canvas® GCCM Types

CC is available in the following thicknesses and roll formats:

CC Type	Thickness (mm)	Roll Width (m)	Dry Weight (kg/m ²)	Batched Roll Coverage (m ²)	Batched Roll Length (m)	Bulk Roll Coverage (m ²)	Bulk Roll Length (m)
CC5™	5	1.0	7	10	10	200	200
CC8™	8	1.1	12	5	4.55	125	114
CC13™	13	1.1	19	N/A	N/A	80	73

1.2 Bulk Rolls / Batched Rolls

CC is available in two formats (roll sizes); bulk rolls or smaller, man portable batched rolls. The quantity per roll differs between the CC thicknesses as shown in the table above.

Bulk rolls weigh between 1.5T and 1.6T and are supplied on 6 inch cardboard cores which can be hung from a spreader beam and unrolled using suitable plant equipment (see right). Bulk rolls provide the fastest method of laying CC and have the additional advantage of reducing the number of joints required. Contact Concrete Canvas® Ltd for spreader beam purchase.

Batched rolls are supplied on 3 inch cardboard cores with carry handles designed as a 2 to 4 man lift. All CC thicknesses can be supplied batched to custom lengths for a small additional charge.

CC is now also available in Wide Rolls of up to 4 times the standard roll width. Contact Concrete Canvas for further details.

1.3 Packaging / Transportation

CC bulk rolls are individually wrapped and palletised on heat treated wooden pallets measuring 1.2m x 1.0m. CC batched rolls are similarly supplied, individually wrapped in airtight PE packaging and palletised. 13 batched rolls fit onto a standard 1.2m x 1.0m pallet. All CC rolls are provided with a basic hydration guide in English.

Typical container stuffing quantities are shown below, for full details of packing weights and dimensions please refer to the [CC Shipping Information](#) document.



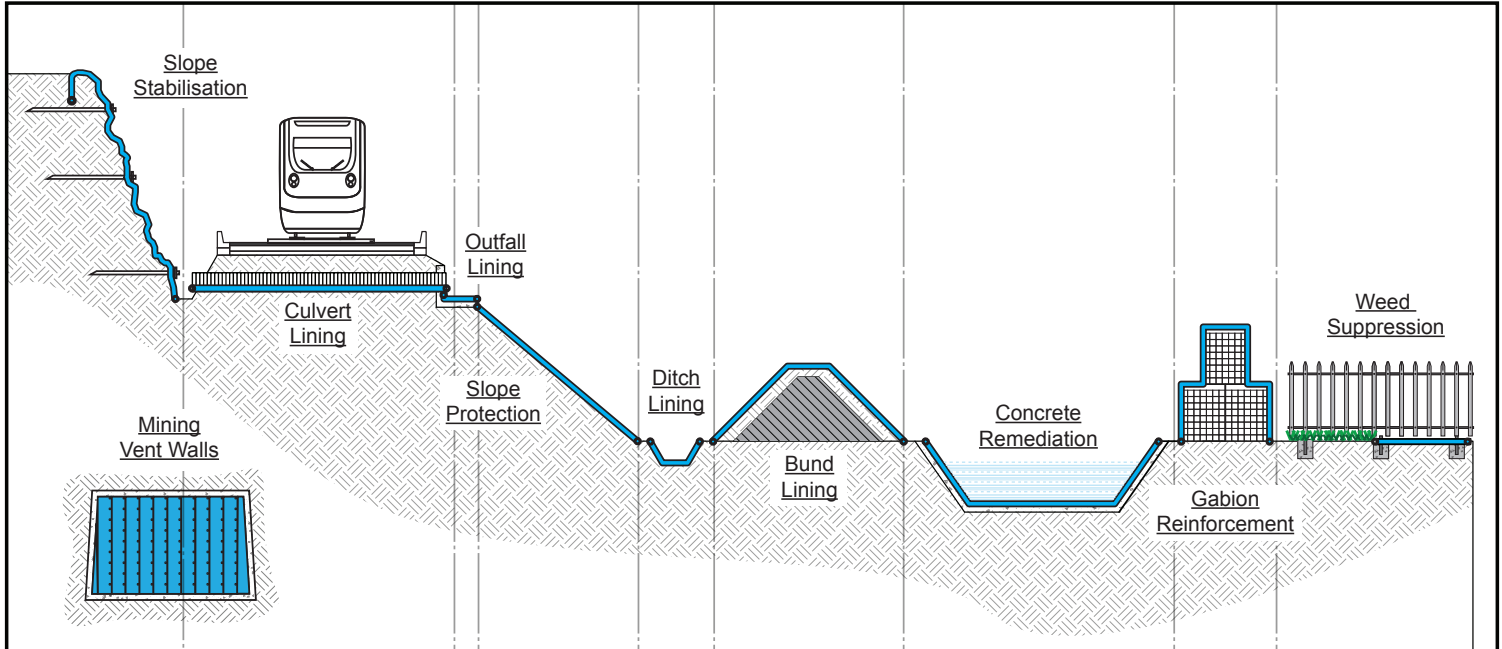
	20ft Container*		
	No. of Pallets	Qty (m ²)	Gross Weight (T)
Batched Rolls			
CC5™	10	1300	11.3
CC8™	10	650	8.6
CC13™	N/A	N/A	N/A
Bulk Rolls			
CC5™	8	1600	13
CC8™	10	1250	15.5
CC13™	10	800	15.5

	40ft Container*		
	No of Pallets	Qty (m ²)	Gross Weight (T)
	20	2600	22.6
	20	1300	17.2
	N/A	N/A	N/A
	16	3200	26
	16	2000	24.8
	16	1280	24.8

* Please check destination country transportation restrictions as container weight limits may vary.

2.0 Applications

CC is typically used to replace conventional concrete (in-situ, precast or sprayed) for erosion control, remediation and construction applications. Some typical examples are given below:



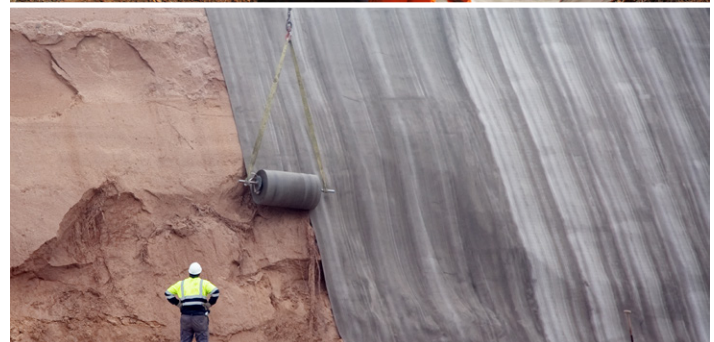
2.1 Channel Lining

CC can be used to provide a hard wearing erosion control surface for lining channels for drainage and irrigation. CC is typically used as an alternative to conventional concrete drainage and where vegetated or earth lined ditches are unsuitable due to high flow rates, containment requirements or the need to reduce maintenance. For full details of how to line a channel with CC please see the [CC Installation Guide: Channel Lining](#).



2.2 Slope Protection

CC can be used to provide a hard wearing erosion control surface to protect slopes from environmental degradation. CC is typically used to replace shotcrete and where vegetated slopes are unsuitable due to ground water, arid climate or poor soil conditions. For full details of how to line a slope with CC, please see the [CC Installation Guide: Slope Protection](#).



2.3 Bund Lining

CC can be used to provide hard armour capping of secondary containment bunds around petrochemical tank farms, munitions depots and flood defences. CC is typically used to protect the bund from environmental degradation, animal damage, improve impermeability and prevent weed growth. For full details of how to line a bund with CC please see the [CC Installation Guide: Bund Lining](#).



2.4 Concrete Remediation

CC can be used to reline concrete infrastructure which has become cracked and damaged and requires remediation. CC is used to extend the life of existing infrastructure, reduce leakage and improve flow characteristics. CC can be used as an alternative to rebuilding or where lining with a flexible membrane is unsuitable due to the flow conditions or durability concerns.

2.5 Culvert Lining

CC can be used to reline steel and concrete culverts which have degraded due to scour and corrosion. CC is used to extend the life of culverts and provide a hard wearing erosion control layer with improved impermeability and flow characteristics. CC can be used as an alternative to relining with bitumen, GRP, polyurethane or sprayed concrete.

2.6 Weed Suppression

CC can be used to provide long-term weed growth prevention in areas where maintenance is difficult such as around sensitive infrastructure or in remote locations. CC is typically used as a replacement for precast concrete slabs and where conventional geotextiles do not provide sufficient durability.

2.7 Outfalls / Spillways

CC can be used to protect surfaces located in high flow areas which are prone to erosion such as underneath culvert outlets, spillway surfaces and over-toppings. CC is typically used to replace conventional concrete solutions and is applied in the same manner as CC slope protection. Thickness selection should be made based on the maximum expected flow rate.

2.8 Gabion Protection

CC can be used to cover steel basket and geotextile gabions to prevent damage from corrosion, UV damage and vandalism. CC significantly extends the life of gabions providing a hard wearing surface that will last for decades. CC can also be used to cap earth filled gabions to prevent FOD (foreign object damage) in military applications and prevent water ingress which can lead to slump.

2.9 Mining Vent Walls

CC can be used to construct walls in underground mines to create ventilation stoppages and blast walls. CC typically replaces walls constructed using brattice cloth, breeze-blocks or plaster board where it provides a long-term solution that is fast to erect with a small logistical footprint.



3.0 Selection Guide

Application	CC5™	CC8™	CC13™	Comment
Channel Lining	○	●	○	Recommend CC8™ unless either of the following conditions apply: Use CC5™ if relining existing concrete channels, hard substrates such as rock, or for temporary works. Use CC13™ if flow speeds are in excess of 8.6m/s, the ground will be trafficked or is particularly unstable or steep.
Slope Protection	●	○		Recommend CC5™. CC8™ may be used on unstable ground or for high flow conditions.
Bund Lining	●	○	○	Recommend CC5™. CC8™ or CC13™ may be used for areas of traffic.
Concrete Remediation	●	○	○	Recommend CC5™ CC8™ or CC13™ may be used where voids are large or end use involves high flow rates or turbulent flow.
Culvert Lining	○	●	○	Recommend CC8™. CC13™ may be used for flows with high levels of debris or high flow conditions. CC5™ may be used for low flow conditions and low levels of debris.
Weed Suppression	●			Recommend CC5™.
Outfalls/Spillways		●	○	Recommend CC8™. CC13™ may be used for outfalls with a high level of debris or with high flow conditions.
Gabion Protection	●	●	○	Recommend CC5™ or CC8™. CC13™ may be used for applications with high flow conditions or prone to impacts.
Mining Vent/Blast Walls	●	●	○	Recommend CC5™ for vent wall applications. Recommend CC8™ for walls exposed to blast, depending on pressure loading

4.0 CC Properties

4.1 Water Impermeability

CC has excellent waterproof properties and offers a level of impermeability similar to clay. In geotechnical terms this is measured using a 'coefficient of permeability' value, k , which represents the rate of water flow through a unit area of material. CC has been tested to BS1377, the test samples had an impermeability of greater than $k = 1 \times 10^{-8}$ m/s. For applications requiring a higher level of impermeability, such as for containment, use CC Hydro™. In order to select a joint with an impermeability level suited to your applications please see the [CC User Guide: Jointing and Fixing](#).



4.0 CC Properties contd...

4.2 Durability

CC has excellent long term durability with twice the abrasion resistance of most OPC (Ordinary Portland Cement) based concretes (ref DIN 52108). Accelerated age testing based on BS EN 12467 has shown that CC has a minimum life of 50 years in a UK climate. This is based on freeze-thaw, heat-rain and soak-dry cyclic testing during which time CC showed minimal degradation. The reinforcing fibres within CC mean it has excellent low-temperature performance and CC has also achieved over 200 cycles of freeze-thaw testing to ASTM C1185.

4.3 Environmental

CC offers many environmental benefits over conventional concrete, typically substituting for 100-150mm of poured concrete for surfacing applications, reducing the carbon footprint of construction works. For a typical project, CC offers CO₂ savings of more than 50% compared to conventional concrete (See [CC Carbon Report](#)). The cement used within CC has a limited alkaline reserve, which means unlike most concretes it is not classified as an irritant and is less damaging to aquatic life (see the [CC SDS](#)). CC has a very low wash-out rate, an analysis by CTL laboratories in the US showed that leachate levels were safely below the EPA (Environmental Protection Agency) limits (see the [CC Environmental Testing report](#)). CC can even be installed in live water courses and has been assessed and approved for use by the UK Environment Agency on a number of UK projects.

4.4 Fire

CC has excellent high temperature performance and has been subjected to Reaction to Fire testing achieving Euroclass B certification to BS EN 13501 (see the [CC Fire Certification](#) document). CC has also been approved by the US Mine Safety and Health Administration (MSHA) to 30CFR, Part 7, subchapter B, Section 7.24. For further information on the performance of CC for a fire protection application please contact Concrete Canvas® Ltd.

4.5 Chemical

CC has excellent resistance to chemical attack and is generally much more resistant to aggressive compounds than conventional OPC based concretes. CC has been successfully tested by 56 day immersion in acid down to pH 1.0 and alkaline up to 13 with no loss of strength, (see the [CC Chemical Testing](#) document). CC also has excellent resistance to sulphates, sulphated water, ground and sea water, and has good resistance to many compounds that attack OPC including; sewage water, chlorides, tanning oils, vegetable oils and most mineral salts. See [CC Sulfate Resistance](#) and [CC Saline Resistance](#) testing.

