

Exemplars: Resource Efficiency in Construction Products

Concrete impregnated fabric

Concrete Canvas is a flexible cement impregnated fabric that hardens on hydration. Several client organisations including the Environment Agency and the Highways Agency have specified Concrete Canvas to line ditches and drains.

Product details

The technology for Concrete Canvas was invented at Imperial College London in 2004. Concrete Canvas Ltd was incorporated in 2005 to manufacture both Concrete Canvas and Concrete Canvas Shelters. Concrete Canvas has been used for roofing and building cladding, although the main applications are in civil engineering; including ditch lining, slope protection, pipe protection, and retaining walls.

Concrete Canvas can be laid into ditches and drains by simply rolling out the fabric. If the ditch is narrow then the fabric is rolled longitudinally along the length of the channel. Alternatively, if the ditch is wide, the fabric is laid transversely with overlaps that can be sealed to form a waterproof lining. In either orientation the fabric will mould to the shape of the channel. After laying, the fabric is pinned to the ground and wet. Once hydrated the fabric remains workable for 2 hours and hardens to 80% strength within 24 hours.

Concrete Canvas comes in rolls 1.0m or 1.1m wide. Available lengths are 4.5m (weighing 60kg) or 200m (weighing over 1.5t). Rolls come in three thicknesses: 5mm, 8mm and 13mm.

Resource efficiency benefits

- An 8mm thick roll can in some applications replace up to 100mm of reinforced insitu concrete.
- Very low or zero wastage in application.
- Around 90% less material usage.
- Up to 95% less embodied carbon.
- Less water is required to hydrate Concrete Canvas than is contained within insitu concrete.
- Fewer vehicle movements due to material volume and weight reductions.

Business Case

Whether laid longitudinally or transversely Concrete Canvas offers value for money for ditch lining projects.

- The installed cost is typically less than the cost of conventional concrete ditch lining, particularly if the roll is laid longitudinally.
- A 100m² section of drain lining can be laid transversely by three men in one day.
- Concrete Canvas can be laid in wet conditions. This can reduce programme disruption typically caused by bad weather.
- The rolls are easy to transport using standard vehicles.
- No handling of wet concrete or formwork.
- Chemically resistant with good weathering performance.
- Fire safe (Euroclass classification B-s1-d0)
- The fibre reinforcement prevents cracking and absorbs energy from impacts.



Concrete Canvas roll

Resource efficiency

Materials quantity

- Concrete Canvas can replace up to 100mm of reinforced in-situ concrete in ditch lining applications.
- An 8mm thick roll is sufficient for many erosion and ditch lining applications.

Materials wastage

- Off-cuts do not generally occur. Unused lengths can be left on the roll for the next project.
- No perishable formwork or additional reinforcement is needed.

Embodied carbon

- Using an 8mm roll of Concrete Canvas can reduce embodied carbon by up to 95% compared with conventional concrete solutions.

Water use

- Less water is needed to hydrate Concrete Canvas than is contained within in-situ concrete.
- Loses only 3% by mass under water (specialist underwater concretes typically lose 10-15%).

Life span (e.g. durability)

- Life expectancy of over 50 years.
- More easily deconstructed than insitu or precast concrete.
- Sections of fabric can be cut, un-pegged, and lifted out of the channel.

M4 interceptor drain lining

Project type:	Interceptor drain lining with cascades
Location:	Wiltshire
Client:	Highways Agency
Contractor:	Enterprisemouchel
Engineer:	R&W Civil Engineering
Construction:	Concrete Canvas laid transversely

Enterprisemouchel needed to clear and repair an interceptor drain adjacent to the M4. A key project requirement was to introduce a series of cascades to reduce the water flow rate. Originally a series of pipes and headwalls was considered, but concerns over pipe blockages prompted the team to consider alternatives.



M4 interceptor drain lining: M4, Wiltshire, UK

- Concrete slabs with sand and cement was considered. The material cost of concrete slabs was lower; however, Concrete Canvas was overall more cost effective due to the reduction in construction time and labour costs.
- Three workers laid 20 metres (100m²) each day.
- Cascades were created by laying the fabric over concrete bagwork.
- The interceptor drains were completed in November 2010 and there has been no need for maintenance since. (Pipes would likely have required periodic maintenance to clear blockages.)

Bedwas coal mine ditch lining

Project type:	Ditch lining at a disused spoil tip
Location:	Wales
Client:	Caerphilly Council
Construction:	Concrete Canvas laid longitudinally

Caerphilly Council needed a solution to create 2000 linear metres of temporary ditches to prevent erosion of the coal mine spoil tip. The solution had to be:

- easy to transport to the top of the mountain;
- watertight;
- resistant to vandalism;
- quick and easy to install; and
- very cost effective.

The cost of using Concrete Canvas was compared to the cost of conventional concrete methods. Conventional methods (e.g. insitu concrete) were estimated to cost £200 /m² including labour. Concrete Canvas cost £50 /m² including labour.



Ditch lining at Bedwas: Courtesy of Caerphilly Council

- The rolls were transported to the base of the spoil tip by lorry. They were carried to the top of the spoil tip using a digger and suspended by the digger while being laid in the channel.
- Concrete Canvas was laid longitudinally in a single strip, which reinforced the invert of the channel.
- There was no wastage.
- Installation was 10 times faster than conventional concrete ditch lining methods.

“We’ve made significant time and cost savings by using Concrete Canvas in four recent drainage projects. It’s helped us overcome logistical and access issues.”

Kevin Kinsey
Engineering Manager, Caerphilly Council

Frongoch quarry ditch lining

Project type: Ditch lining at an old quarry site
Client: The Environment Agency
Construction: Concrete Canvas laid longitudinally

The Environment Agency needed to divert the course of a stream that flowed through a quarry, to prevent heavy metal contaminants reaching a river. Concrete Canvas was used to create 200m of ditch to carry the contaminated water to a clay bed filtering site. The fabric was laid in longitudinal strips with overlaps.

The EA specified Concrete Canvas as it offered:

- speed, practicality and value for money;
- prevention of any potential pollution issues; and
- avoidance of waste associated with conventional solutions (e.g. shuttering).



Concrete Canvas being applied to a channel:
Courtesy of the Environment Agency

Company contacts

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