CONCRETE CANVAS®

CHANNEL LINING

Project Info

- 01 / 08 / 16
- CC8™ Bulk Rolls
- 11,125m²
- Transverse layers
- Central Vancouver Island, Canada
- Undisclosed
- CC lining of a large diversion channel at an underground zinc and copper mine in Canada.

Nuna Innovations Inc.

Completed CC lined channel with high flow 5 weeks after installation

In August 2016, over 11,000m² Concrete Canvas® (CC) GCCM* was installed as a protective liner for a large diversion channel at an underground zinc and copper mine on Central Vancouver Island, Canada.

The diversion channel, which conveys clean water from the hillside above to a lower creek, was originally lined with shotcrete but the material had begun to degrade over time. It was recommended that the diversion channel should be enlarged and realigned to effectively handle the high-water volume and velocities.

Alternative options such as replacement shotcrete were considered, however CC was specified due to its ability to cope with high water velocities, its ability to accommodate variance in profile and the ease of repair if future damage occurred due to falling trees or large boulders from the above hillside.

Since the water was diverted away from the channel during installation, the speed of installation was key as the diversion pipes wouldn't be able to handle the high-water volume expected to begin in early October. The use of CC meant measures could be in place much faster than using conventional concrete or shotcrete. The fibre reinforcement inherent in CC gives a durability and design life well above alternatives, whilst the integral PVC backing ensures minimal water loss in the diversion channel. The channel was designed to handle water velocities of up to 20m/s with slopes as steep as 16% and 20% in some sections.

*Geosynthetic Cementitious Composite Mat

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Prior to excavating the new diversion channel, the main contractor completely removed and disposed of all trees, brush and other vegetation growth in the area. Any standing water was drained away from the exposed excavated areas to prevent pooling and infiltration.

Prior to installation, a new channel was created which was significantly wider than the original shotcrete lined channel. The final channel measured 735m in length, 5-8.5m wide with an average depth of 1.5m with a 2:1 side slope. Due to the anticipated flow velocities, 8mm thick Concrete Canvas (CC8™) was specified. The 125m² CC8™ bulk rolls were delivered to site and positioned strategically along the channel to save time and minimise handling and vehicle movement during installation.

To account for the variation in profile width, a transverse layup was specified and bulk rolls of CC8™ were deployed from a spreader beam mounted from an excavator to unroll the material across the width of the channel. Adjacent layers of CC8™ were overlapped by 100mm in the direction of water flow and secured using 1.5m earth percussion anchors with 3mm stainless steel cables every meter along the overlaps. These were used in conjunction with 8 stainless steel 1" screws at 150mm intervals. The CC was pinned into 300mm deep anchor trenches on either side of the channel using the 1.5m earth percussion anchors. The trenches were then backfilled with material to provide a neat termination and prevent water ingress. When fixing the CC to rock in some sections of the channel, Hilti rock anchors and 600mm rock bolts were used.

The material was hydrated using a water truck and due to CC having a very low wash out rate and low alkaline reserve, treatment of the run off from installation was not required. CC has a working time of approximately two hours from hydration, meaning that work can continue even in very wet conditions. This can reduce programme disruption typically caused by bad weather when using traditional solutions.

Previous channel section originally lined with shotcrete and showing signs of degradation

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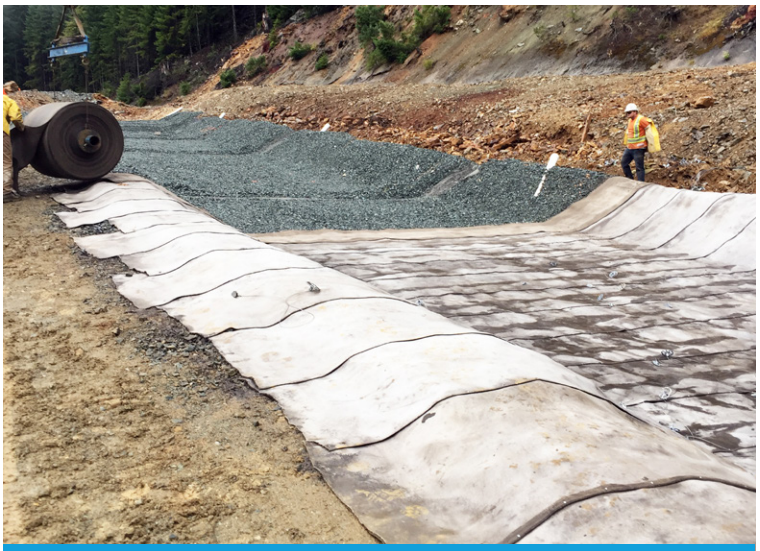
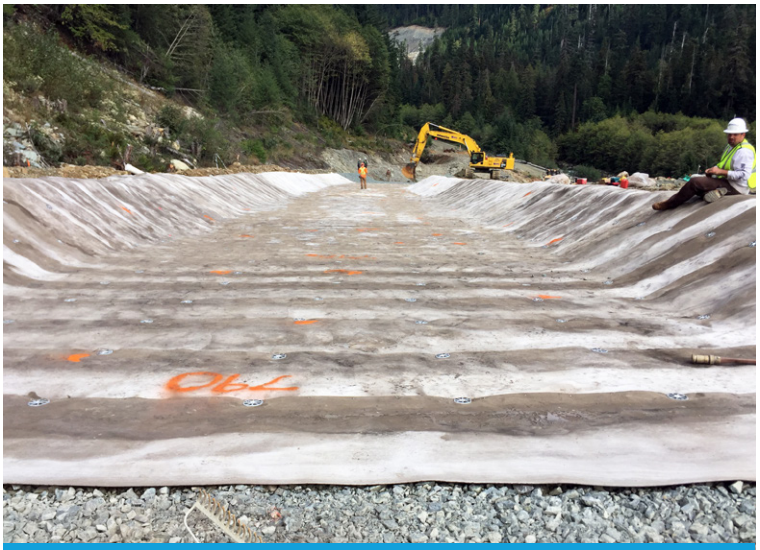
Dispensing of bulk roll CC8™ via spreader beam mounted onto excavator



Anchor trench prior to backfilling

Screwing overlapped joints at 150mm centres



Spacing of percussion anchors through overlapped CC8™ layers

Hydration of the CC layers. CC run-off did not require treatment prior to discharge into the local water course

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Aerial view of installation

Aerial view of the mouth of the channel showing transition anchor trench

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Aerial footage showing completed CC lined channel in relation to the mine

The installation took 6 weeks to complete with an average crew size of 6 men and daily temperatures up to 34°C.

The client was satisfied with the product and the minimal amount of specialist training or equipment required. In addition to this, the speed of installation meant the project was completed before the heavier precipitation arrived at the mine in early October which may have caused significant project delays.

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