

Project Info



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Bulk CC8 and CC13



10'150sqm



Transverse layers



British Columbia,
Canada



- Carrier drain directing
effluent from coal
mine to settling pond.

- Low temperature.

- Variable ground
conditions.



Completed lined ditch channel and culvert.

Concrete Canvas (CC) is a versatile construction material that has a wide variety of applications across a range of sectors. CC has predominantly been used for ditch lining in the private civil construction industry, but increasingly CC is being specified in the mining sector for general water management projects across the globe. CC can be installed quickly, and is uniquely suited for installation in remote, difficult to access sites of all terrains and in all weather conditions making it ideal for time-critical mining works.

Following the recent success of a 52'000sqm CC installation in the Alta Montaña III region of Chile, Ledcor Group, acting on behalf of Walter Energy, specified CC as a protective liner for a large carrier ditch, directing mining industrial waste water from Willow Creek mine to a nearby settling pond.

Willow Creek is a large open pit mine located 45 kilometres west of the town of Chetwynd, in northeast British Columbia. The mine is a truck and shovel operation and is capable of producing both hard coking coal and low-volatile PCI coal for steelmaking.

The customer specified that the lined ditch had to be as water proof as possible, handle freeze/thaw conditions, and be easy to repair. The carrier ditch was 10.5-12 meters wide, between 3 and 5 meters deep and approximately 650 metres long. The overall size, performance requirements of this particular application, as well as the cost potential meant that Ledcor were reluctant to use Shotcrete.

CC was dispensed in bulk rolls from spreader beam equipment and was cut to length on site, minimising waste as lengths were cut specifically to each section of profile. No perishable formwork or additional reinforcement was required.



British Columbia Ditch Lining cont.

CC layers were laid transversely across the width of the ditch, with adjacent layers overlapped by 100mm and beaded with Sikaflex 1A to create water tight joints. Overlaps were fixed together using 25mm screws for neatness and flushness. Where possible, end edges were buried with loose shale and aggregate to prevent water ingress under the CC and to provide a neat seamless termination with the crest of the ditch.

The ditch was excavated from a blasted rock substrate, with some sections reinforced with concrete block work. CC layers were pinned into position at the top of the profile using 10" Ardox galvanized spikes. When fixing CC to the concrete block work sections, Hilti rock anchors were used. In its unset flexible state prior to hydration, CC can be fixed to almost every type of substrate using standard off-the-shelf fixings or adhesives.

The ditch terminated in a 4m diameter corrugated steel and concrete block work culvert and sump which was also lined with CC to ensure minimum water loss, as water was contaminated from tailings and could not come into contact with any other water sources.

Grouting was chosen in areas that may be prone to heavier flows and related scouring. In an effort to minimize the possibility of potential debris dams, grouting also eliminated the lip that was caused from the overlap of CC layers.

The fibre reinforcement inherent in CC gives a durability and design life well above competitor geomembrane products, whilst the integral PVC backing ensures minimal water loss in the carrier ditch. The CC will moss over in time, blending in with the surrounding environment but will prevent root growing vegetation, reducing the need for maintenance of the ditch.



Large settling pond collecting effluent from nearby Willow Creek coal mine, British Columbia, Canada



Excavating the sump and constructing the culvert



CC dispensed from bulk rolls



Using plant to unroll CC bulk rolls across channel

British Columbia Ditch Lining cont.



Lining the culvert with CC8



Applying Sikaflex beading to joints



6" steel anchor nails with 1" hex head washers



Hydration of CC using bowser equipment



Swale was formed on the north ridge of the ditch at a nearby tree line to collect surface rainfall from an adjacent hillside.



British Columbia Ditch Lining cont.

A swale was formed on the north ridge of the ditch at a nearby tree line to collect surface rainfall from an adjacent hillside, using the ability of CC to closely follow the profile of existing slopes and negotiate tight bends and curvatures.

CC has a working time of approximately two hours from hydration, meaning that work can continue in very wet conditions. This can reduce programme disruption typically caused by bad weather when using traditional concrete solutions. Plastic sheeting was used to protect the CC during setting when temperatures dropped to below -5°C.

The contractors completed the work on schedule in under six weeks, installing over 10,000sqm of CC in a remote site and in difficult weather conditions. Ledcor were impressed with their first experience of CC and cited the following advantages over traditional concreting methods as reasons for the success of the installation and why they would recommend CC for future projects:

- speed and ease of installation
- minimal amount of training or special equipment required
- ability to be installed in all weather conditions
- minimal waste material compared to shotcreting

CC also allowed substantial budget savings. Shotcrete was the originally specified product, but required a batch plant to be constructed and operated on site to achieve completion in the least expensive manner. It was therefore decided that other options needed to be explored.

“The end result is that there would have been an extra zero on the end of the price quote, if we had elected to use Shotcrete “

*Bud Fassnacht
Ledcor Superintendent*

“As an engineer, I liked the fact that CC was adaptable to changes in channel shape as we had segments of trapezoidal shape that had to transition to a rectangular shape. The drape characteristic allowed the CC to be placed on a pretty rough surface. Finally it seems that any future damages to the CC will be easily fixed by patching. This should result in very low maintenance costs.”

*Michael Graham
Senior Geotechnical Engineer
Norwest Corporation*



Completed lined ditch channel