TYPE II & TYPE III GCCM CHANNEL LINING

Project Info

- May 2019
- CC8™ (Type II) and CC13™ (Type III) Bulk Rolls
- 8,240m²
- Transverse layers
- Eagle Gold Mine, Yukon, Canada
- JDS Energy
- CC8™ (Type II) and CC13™ (Type III) were used to provide erosion control and channel lining to two spillways

WATCH: CASE STUDY VIDEO

Concrete Canvas® installation at Eagle Gold Mine in Canada

Geosynthetic Cementitious Composite Mats (GCCMs) are increasingly being used to provide durable surface erosion control solutions for a range of applications. As a result, there is a growing need to standardise the classification and define the intended uses. Users can now protect themselves by specifying GCCMs that conform to the only international specification standard for GCCMs, by using ASTM D8364 'Standard Specification for GCCM materials'.

ASTM D8364 is an essential tool for all GCCM users, making specifying the right product easier for the designer whilst ensuring they meet minimum performance requirements, helping to prevent project failures. Concrete Canvas® GCCM (CC) is the original GCCM and the first product to declare conformance to ASTM D8364. GCCMs are flexible, concrete filled geotextiles that harden on hydration to form a thin, durable and waterproof concrete layer.

The CC lined channel at Eagle Gold Mine,Yukon, Canada, illustrates the importance of specifying the correct GCCM. Installed in May 2019, Both Type II (CC8™) and Type III (CC13™) GCCMs were used - Type II GCCMs are used for channel lining applications on medium dense subgrades, such as firm clays & compacted soils. Type III GCCMs offer increased durability in certain areas where scour or impact is more prevalent.

*Geosynthetic Cementitious Composite Mat

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Eagle Gold Mine site

Main spillway

The spillways formed part of the Eagle Gold Mine operated by Victoria Gold, located in northern Yukon, approximately 200km from the Alaskan Border. The local area is subjected to seasonal variance of 20° to -30°C.

Alternatives to Concrete Canvas that were considered included poured concrete with an applied coating. This was discounted due to concerns about the logistical requirements and installation rates.

The spillways were designed to convey any overtopped heap leachate in the case of extreme weather events. The spillway would only likely experience any flow in the case of a 200-year storm event. The site is heavily monitored by the Canadian mining regulator and Ministry of Mining.

The main spillway is approximately 500m in length with profile sections of 5-8m at 7-15%. CC8™ (Type II) GCCM was used for fall sections of 7.5% and CC13™(Type III) GCCM was used where the fall of the section increased to 15%.

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Main spillway channel to be lined with CC

Emergency spillway channel to be lined with CC

The emergency spillway is approximately 140m in length of varying width at 50% gradient and lined exclusively with CC13™ as per the specification of the engineering consultant, BGC Engineering.

The main spillway was installed using a standard CC screwed and sealed overlap joint; by hydrating the underlaps and applying an 8mm bead of Soudal 250XF adhesive sealant, then folding the overlap back into position and securing the material together using stainless steel screws at 200mm centres. The CC was secured in an anchor trench at the crest with ground pins before backfilling to prevent perimeter water ingress.

BCG asked Concrete Canvas ltd to review the hydraulic design of the spillways to advise on whether the CC material required intermediate fixings in order to resist the anticipated hydraulic shear forces. Concrete Canvas input site parameters into their hydraulic calculator. It was determined that the main spillway did not require intermediate fixings, but they were necessary for the emergency spillway due to the shear forces generated along the 50% channel gradient. Rock anchors were installed at 1.8m centres along each overlap joint for the main spillway section. At a 90° corner, anchor centres were no more than 0.5m apart.

The onsite contractor, JDS Energy and Mining Inc installed the material at a rate of 750 – 850m^2 per day in temperatures of 15°C. BCG valued the hydraulic design advice provided by Concrete Canvas Ltd and the client is satisfied that the spillways were installed to meet the program.

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Bulk rolls of CC13 and CC8 deployed via spreader beam

Installation starting downstream of main spillway.

Hydration of the lined channel

Joints were sealed and screwed for increased impermeability

Upstream section of completed channel

Installation of percussion anchors on emergency spillway section

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Both completed CC spillway channels on the Eagle Gold Mine site

CC8™ is designated as a Type II GCCM and CC13™ as a Type III GCCM, as defined in ASTM D8364 - Standard Specification for GCCM Materials. ASTM D8364 is the only internationally recognised GCCM specification standard and lists erosion control applications by three classifications, Type I, II & III, defining the minimum performance values required for each type based on the use of test methods that are specific to GCCM materials. ASTMs are an important resource for clients, consultants and contractors wishing to ensure the GCCM used on their project is fit for purpose. The performance properties of Concrete Canvas® GCCM materials have been independently tested with all products exceeding the performance requirements for Type I, II & III GCCMs respectively. Further information on ASTM D8364 can be found here.

The ASTM specification standard for GCCMs enables consultants and contractors to fulfil projects without being misled by manufacturers who provide performance data using inappropriate non-GCCM standards that may not represent the performance achievable in the field. Concrete Canvas Ltd is ISO9001 certified; priding ourselves on the responsible sourcing and production of our products. CC is BBA certified with durability in excess of 120 years when used in erosion control applications.

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