SLOPE PROTECTION

Project Info

- 12 / 12 / 18
- CC5™ Batched Rolls
- 1600m²
- Longitudinal layers
- KM 31, Sabah, Sarawak, Malaysia
- Undisclosed
- CC5™ used to provide slope protection for a gas pipeline

Completed slope protection installation

In December 2018, Concrete Canvas® (CC) GCCM* was specified by a client to be used as a rapid slope protection solution in Malaysia.

A 500km gas pipeline was built from Kimanis in Sabah to Bintulu, Sarawak in Malaysia. The pipeline cuts through remote areas in the states of Sabah and Sarawak. A simple and rapid solution was required to protect failed slopes along the pipeline. CC was chosen for the project due to its easy transportation on remote sites like this one, and simple installation with no requirement for specialist training or equipment. Conventional methods such as shotcrete would have been difficult to install and much higher in cost, making CC the best choice.

Access to the sites was via a logging road which is prone to becoming muddy and slippery after heavy rainfall. As a result, batched rolls of CC were specified for the project and loaded into 4-wheel-drive pick-up trucks and driven to the sites. Works were carried out on a number of sites through the area, with some situated a few hundred kilometres from the nearest town. As a result, ease of transportation both to and on-site was incredibly important.

Prior to the installation, the slope was prepared according to CC's Installation Guidelines. An anchor trench was then prepared at the crest of the slope, in which the leading edges of the CC material would be secured and later buried to prevent water ingress. A toe drain was then prepared to divert surface runoff and rain water in order to ensure further failure of the slopes would be avoided.

*Geosynthetic Cementitious Composite Mat

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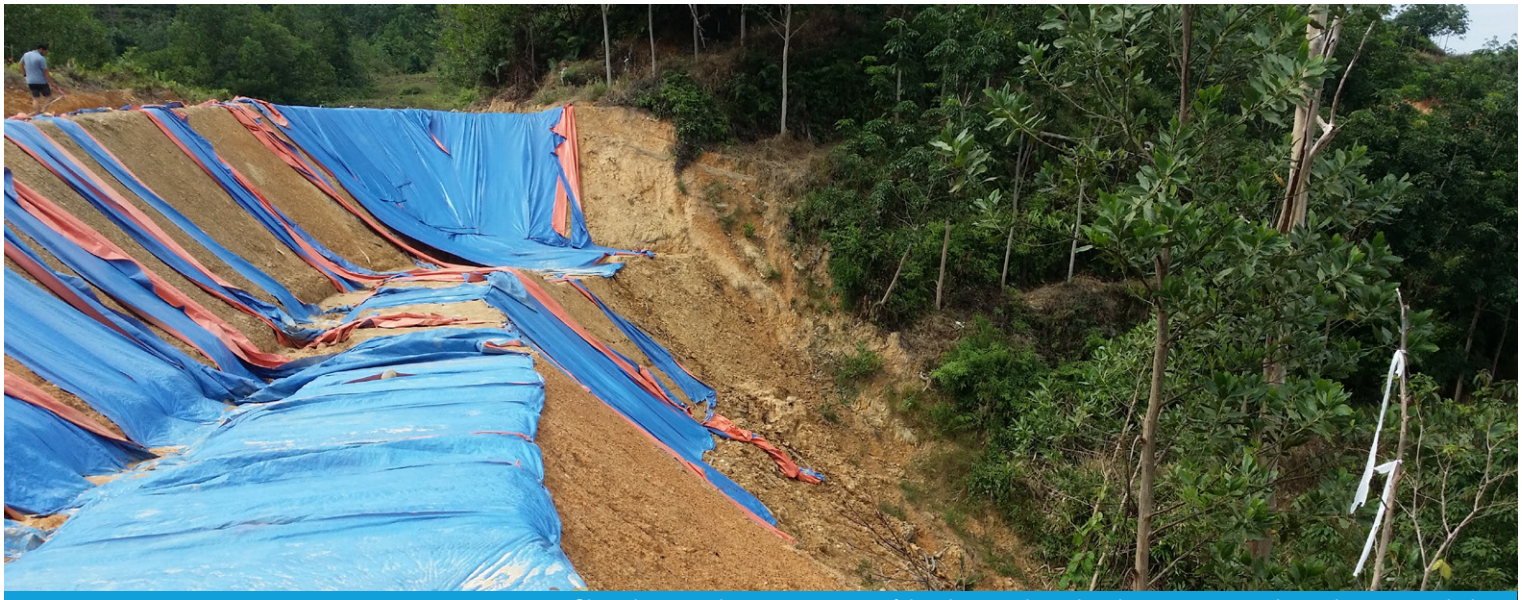
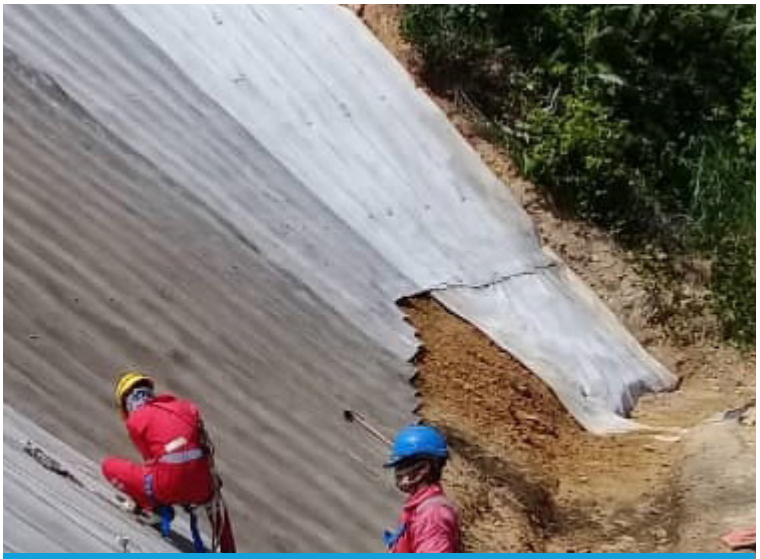
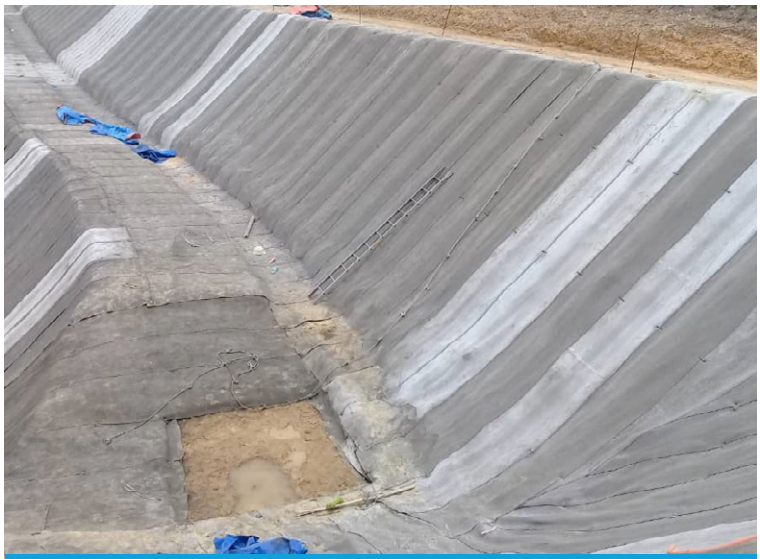


Site prior to works - steep nature of the slope and restricted access meant alternatives were ruled out

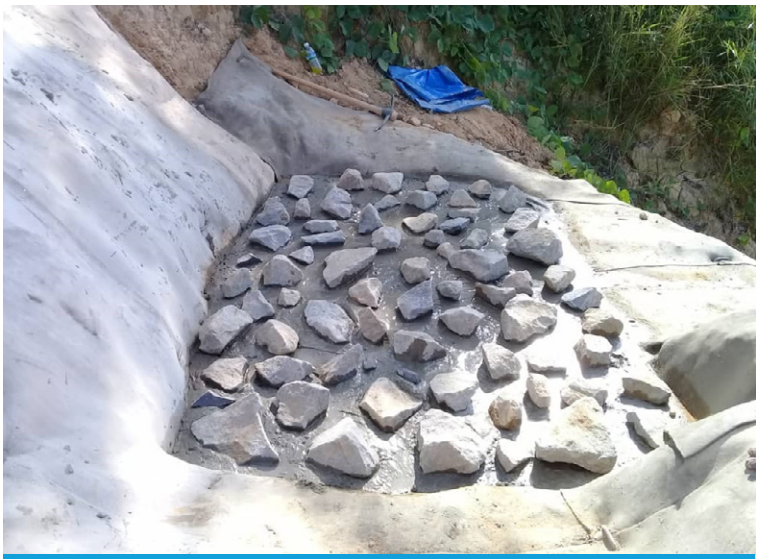
Using ground pegs to secure CC



Fixing CC joints and example of sections overlapped in direction of water flow



Installation of CC completed, prior to addition of dissipation area



Completed water dissipation area

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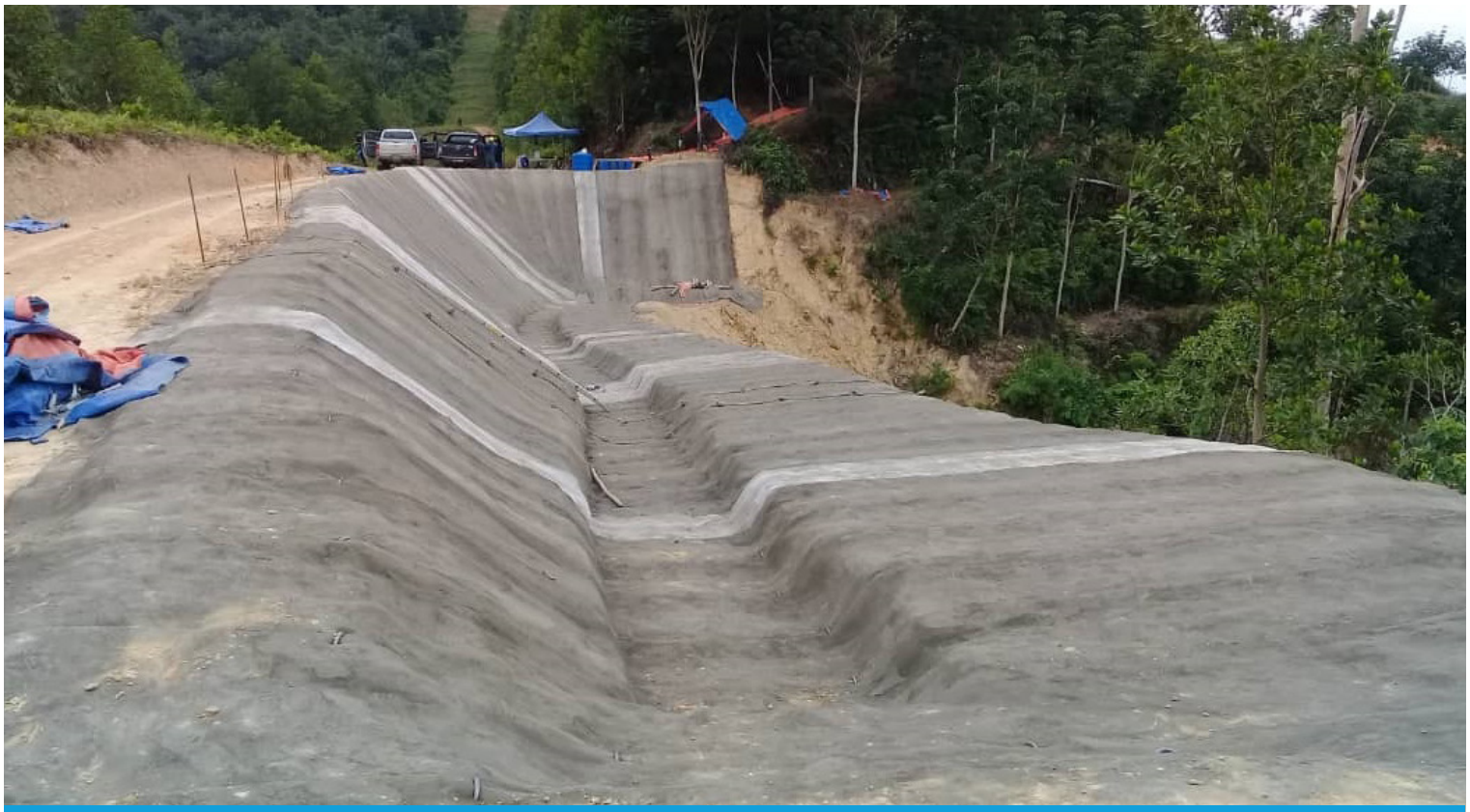

Completed installation prior to hydration

The CC batched rolls were unloaded from the truck and transported by hand to the crest of the slope. The material was then unrolled vertically down the face of the slope, from crest to toe, and secured within the anchor trench at the crest using steel ground pegs. Subsequent lengths of material were laid, overlapping the last by 100mm. The overlapped layers were then fixed using stainless steel screws. Where toe drains were present, a second length of CC was installed with the leading edge placed below the lower end of material used to protect the slope. This meant the overlap was installed in the direction of water flow, preventing ingress from any surface and rain water runoff. The CC then lay transversely across the channel, and terminated within a second anchor trench on the far channel shoulder.

On some slopes, existing and newly installed infrastructure had to be negotiated and accommodated by the CC, including the addition of rocky sections placed alongside the drainage channels part way down the slope. These were installed to provide water energy dissipation.

Following installation, the CC was hydrated via a water tank transported to site. An average of 100-200m^2 were installed per day, taking around 5 hours as a result of the limited site access and challenges associated with installation on such steep slopes. The installation works were carried out over 10 days.

The client was pleased with the outcome of these installations, the time taken to complete the works, delivery times, the ease of installation and the strength of the material. As a result, CC has been specified for 80% of the slope and drainage works for 2019.

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