



In April 2018, Concrete Canvas® was used to prevent erosion of a French drain side wall, and line a drainage channel in Sohar, Oman.

The site, owned by ORPIC, a Chinese engineering company, is a large power plant. As is typical with the region, the substrate is heavily sand-based, making it prone to water and weathering erosion. The French drain measured around 1.2m in depth and 30m long, with sloping walls and a stone-covered floor. The substrate had meant that the drain was not performing as well as it could be, and the client therefore looked into channel lining methods which would provide a durable, long-lasting solution that could provide an impermeable layer in order to prevent further erosion.

Shotcrete and poured concrete were discussed, but the time required for installation of these methods, along with the sensitivity of the site due to proximity of infrastructure, meant these solutions were unsuitable. The speed and ease of installing CC, as well as its ability to be easily installed around existing infrastructure of various types, meant the product was specified for the project.

The works were carried out by SEPCO and Douglas OHI/BLC for ORPIC with consultation provided by Black and Veatch.

*Geosynthetic Cementitious Composite Mat



French drain prior to works



Soil-based substrate showing signs of erosion



Smaller French drain prior to works



CC lengths manually transported

Prior to the installation, ground preparation was required, consisting of the re-working and re-grading of the slope and banking of the corners. The channel base was also cut down to sit below the level of the fill to allow for a drainage or infiltration channel to be created in the centre of the existing channel, which would take the water away. A grid system was then created, corresponding each section of the channel where a length of CC would be laid, to the lengths once batched, to allow for full traceability in the installation process and following works while observing the CC's performance.

Longitudinal layers of the CC material were used in the installation. The team of 12 began the process with the trench and crest of the slope, manually placing a single length across one of the longer sides first, and working around the channel. The edge of the CC was pegged into the anchor trench to secure the material.

This was repeated along each side, before a second length was batched and placed, covering the bottom half of the slope, and a third to cover the toe of the slopes, and the channel base around the central drain. Once the lengths of CC were in position, the team arranged them to ensure the joints lay in the direction of overflow.

The CC lengths were secured using hoop pegs at intervals of every 3m. The overlaps were sealed using Clearfix adhesive sealant, piped in two parallel lines along the joint, before screws were inserted in a staggered line every 50mm. Once the sides were completed, the corners and inlet drainage channels at each end were then worked on. The inlets were sealed, jointed and the sealed again using mortar around the edges to prevent ingress.

Once the installation was completed, the CC was hydrated using water from an on-site source, and a 5000-gallon tanker. Following the first hydration, the team waited an hour before hydrating the material again. A third hydration was given the following morning due to temperature increases over night.



Installation of first CC layers



Completed installation of three CC layers



Corner detail



Installation of CC around drain inlet



Completed installation prior to hydration

The installation was carried out in 7 hours, using 400m² of CC5™, with a total of 6700m² of the material purchased for various works on the site. The installation took longer than anticipated due to issues with getting permission to work, and waiting for supplies. The team worked between 6:30am – 12:00pm, and 2:00pm – 6:00pm. The team took two hours for lunch, as is customary for the area, due to the increase in temperatures at this time of the day.

The project was deemed a success, and the engineers visiting on site were surprised and impressed by how quickly the team were able to lay the CC and the rapid process of setting. They were also impressed by how closely the CC followed the slope profile.

The client and contractors had originally agreed on a timeframe of 3 days in which to carry out the installation. As a result, two full days were saved, also leading to cost savings for the client, including the evasion of penalties for late completion. The pre-batching of the material and grid system meant the team completed the installation with less than 1% material wastage.

Ramesh, Chief site engineer DOHI said he was over the moon at how quickly we installed the product and the training given to his team. This allowed them to carry on and do the second trench with just visual supervision from the BLC team. We also met the team last week whilst on another job, which was a result of what we did for SEPCO and they were ahead of schedule to the extent the main contractor was now ahead of target.