Tunnel Drainage

Cavidrain Invert, Tseung Quan O, Black Hills Tunnels, Hong Kong

abg creative geosynthetic engineering

Case Study

Project Description

In constructing the Black Hills Tunnels, Hong Kong, the Mass Transit Rail Corporation (MTRC) formed a partnering agreement with the consultant (Halcrow) and the contractor (Dumez GTM – Chun Wo JV). This dynamic partnership enabled the consideration of innovative new construction methods. In order to address the major issues of drainage clogging and speed of installation, ABG worked with the Partnership to develop a new concept in tunnel invert drainage, believed to be a world first.

The Challenge

There were two main areas of concern with this drill and blast project. In conventional systems for tunnel drainage, ground water flows around the rear of the liner, into a crushed stone layer at the base of the tunnel and finally into a trench containing a perforated pipe. Previous experience indicated that the small pipe perforations have been known to block through calcification and if this happened there would be no easy means of remediation once the concrete slab had been cast and the track installed.

Further, construction of the traditional drainage using pipe and a crushed stone drainage layer, was time consuming and a limiting factor on the speed at which other operations in the tunnel could progress. The solution required was a method which would eliminate this part of the construction from the critical path.

The Solution

Cavidrain Invert 60, HDPE cuspated sheet drainage was placed over a filter textile on a fine, compacted stone levelling layer across the whole area of the prepared

Project Information

Client	Mass Transit Rail Corporation of Hong Kong (MTRC)
Contractor	Dumez GTM – Chun Wo JV
Consultant	Halcrow (China)
Products	Cavidrain Invert 60
Quantity	42,000 sqm
Benefits	• Rapid installation removes drainage construction from critical path • High flow rates eliminate calcareous clogging concerns • Easy maintenance • Cost saving

ABG Cavidrain Invert

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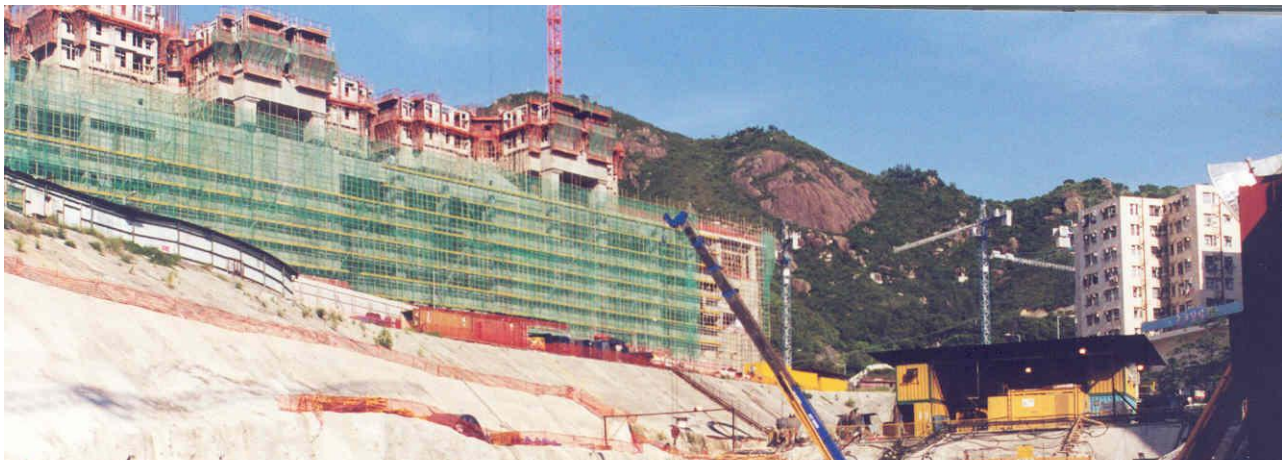
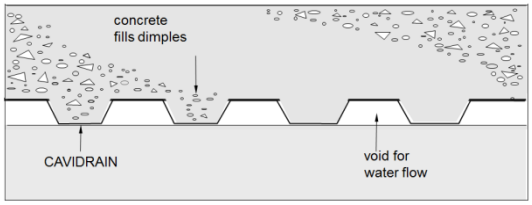
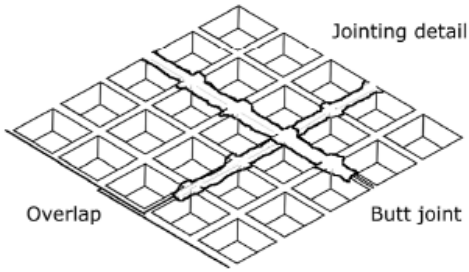


invert. After sealing **Cavidrain Invert 60** onto the wall lining system a 300mm concrete slab was poured in 12m bays. This replaced the traditional stone drainage with a faster and more efficient installation method, effectively removing drainage construction from the critical path. **Cavidrain Invert 60** has wide, interconnecting drainage channels allowing large volumes of water to flow and this successfully removes any likelihood of calcareous clogging in the drainage layer. Being close to the surface, inspection chambers for cameras and jetting were easily constructed to facilitate future maintenance. **Cavidrain Invert 60** was bespoke manufactured with jointing adjustments to accommodate the horizontal radii of the tunnel.



Open void for easy flow of water and straight channels for jetting away any calcareous build up.

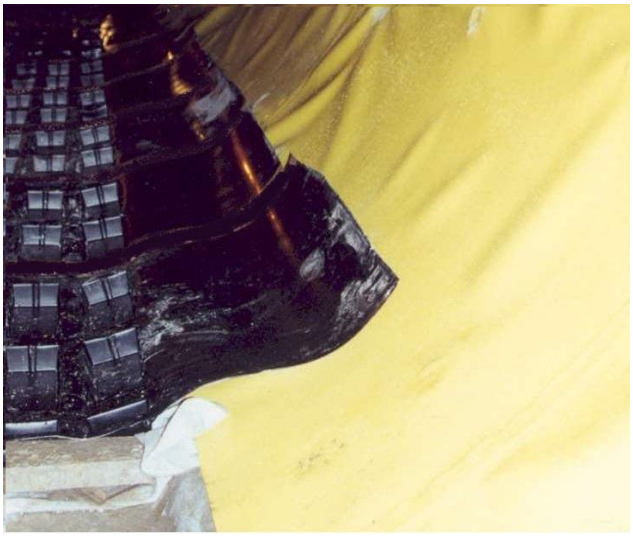


Detail showing alternatives of butt or overlap jointing where four panels meet sealed with ABG Abseal Butyl tape

The ABG Service

ABG, with its experience of cuspated HDPE technology and civil engineering, developed a bespoke Cavidrain product within 8 weeks to meet both the required flow criteria and bearing area to safely dissipate the anticipated braking stress of a train.

Preparing concrete pump to fill Cavidrain voids



Overlap detail with tunnel liner

Contact ABG today to discuss your project specific requirements and discover how ABG past experience and innovative products can help on your project.

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