

# TenCate Miragrid® XT

## Reinforced segmental block culvert wall, Redbank Plains QLD



The conversion of farmland into the development of the Redbank River Park Industrial Estate in Redbank Plains, Ipswich, Queensland required construction of Monash Road; a new primary road into the estate. The road alignment crossed a creek bed comprising soft ground which required the construction of a culvert and a vertical retaining wall with its highest point being at the culvert.

The designer chose a Keystone® Compac segmental block structure with Miragrid® XT geogrid reinforcement that encompassed a concrete pipe culvert passing through the base of the wall to allow surface water from the estate to flow out beneath the wall structure. The 230 m long structure with a maximum height of 7.2 m was designed in accordance with British Standard BS8006:2010 and Australian Standard AS4678:2002 to support high volumes of heavy vehicular traffic with a design life of 120 years.

Foundation conditions in the location of the creek bed comprised soft clay requiring excavation and replacement with a 1 m rock mattress foundation to support the culvert and prevent differential settlement between the culvert and the remainder of the retaining structure. To ensure water flowing through the culvert was

discharged away from the base of the culvert wall, and to prevent the risk of local erosion, a stone filled wire mattress protection layer was installed within the creek bed beyond the wall.

To provide a stable base for the retaining wall a 0.3 m thick reinforced concrete foundation pad was constructed along the wall length. Keystone® Compac segmental blocks were used for the wall facing. Layers of Miragrid® 8XT geogrid reinforcement, having an initial tensile strength of 110 kN/m, were installed at 0.6 m vertical spacings and 8 m constant lengths. A 0.6 m thick vertical drainage layer with a nonwoven geotextile filter was installed immediately behind the block facing units.

The reinforced fill was a good-quality granular material and this was compacted to 95% Standard Proctor density using a sheepsfoot roller.

Two rows of guard rails were installed on top of the wall. The outer guard rail immediately behind the wall face was to protect people from falling over the wall. The anchorage for this guard rail along the top of the wall face consisted of PVC pipes placed down behind the facing blocks with the guard rails subsequently concreted in place. For the inner row

of guard rails protecting the road edge were installed in a similar manner.

It was observed that there was no deformation of the retaining wall during construction and the wall remains in an excellent condition, even under heavy traffic loadings and flood events.

**Council:** Ipswich City Council, Queensland, Australia.

**Main contractor:** Shadforths Civil Contractors Pty Ltd, Queensland, Australia.

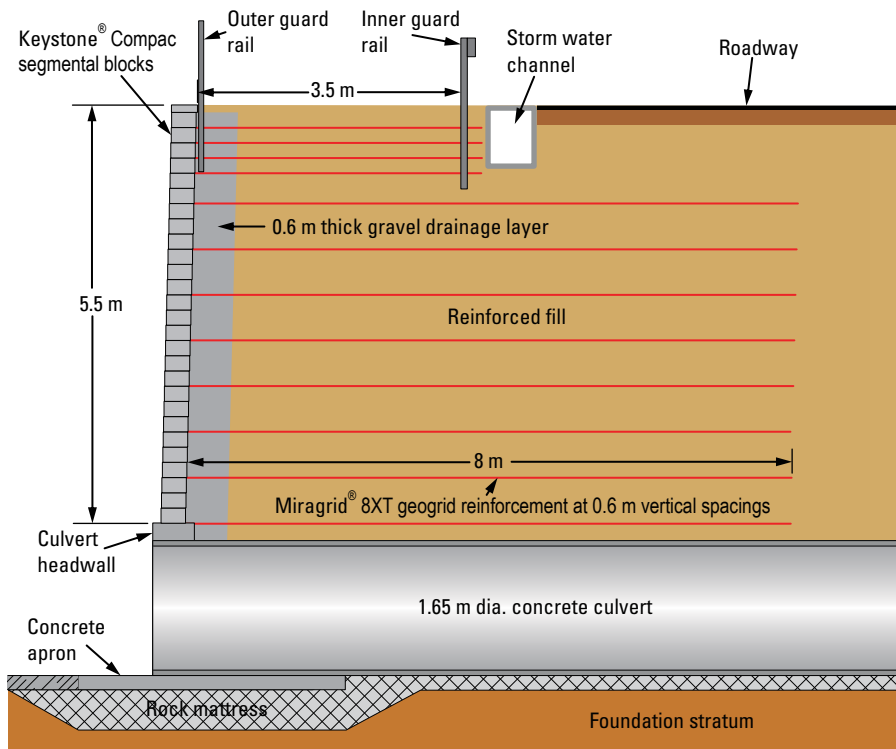
**Wall consultant:** Geoinventions Consulting Services Pty Ltd, Queensland, Australia.

**Wall contractor:** Concrib Pty Ltd, Queensland, Australia.

AS4678:2002 Earth-Retaining Structures, Standards Australia.



Soft soil conditions through culvert area



Cross section through reinforced segmental block wall at location of culvert

BS8006:2010 Code of practice for strengthened/reinforced soils and other fills, British Standards Institution.



Keystone® Compac block wall at height of concrete culvert head wall



Reinforced segmental block wall showing Keystone® Compac block, Miragrid® 8XT geogrid and drainage layer components



Compacting the granular reinforced fill behind the segmental block wall



View of PVC pipe immediately behind block facing to house outer guard rail



Construction of the reinforced segmental block wall using Miragrid® 8XT geogrid reinforcement cut to design length



Completed reinforced segmental block wall at culvert location