CASE STUDY

Labrador-Carrara Rd & Ashmore Rd Intersection Upgrade

Gold Coast, QLD, Australia
Reinforced Earth® retaining wall

Owner: TMR QLD
Consultants: GHD Consultants
Contractor: McIlwain Civil Engineering Pty Ltd
Construction: Feb 2016 – Dec 2016

Background:
The Labrador-Carrara Road and Ashmore Road Project is part of the Queensland State Government's $160.7 million funding commitment to road network improvements on the Gold Coast. This project is one of several which will ensure that the road network can cater for current and expected future traffic volumes ahead of the Commonwealth Games in 2018. The project cost is estimated at $30 million.

The construction contract was awarded to McIlwain Civil Engineering Pty Ltd in October 2015 to convert the existing roundabout to a signalised intersection. Construction works are underway to remove the existing roundabout, configure traffic lanes, and to install traffic signals and traffic islands. This scope of works is expected to be completed by late 2016.

McIlwain Civil Engineering Pty Ltd proposed a new reinforced soil structure to replace the existing crib type retaining wall, which is situated within the centre median between the northbound and southbound lanes of Ross Street on the southwest side of the roundabout.

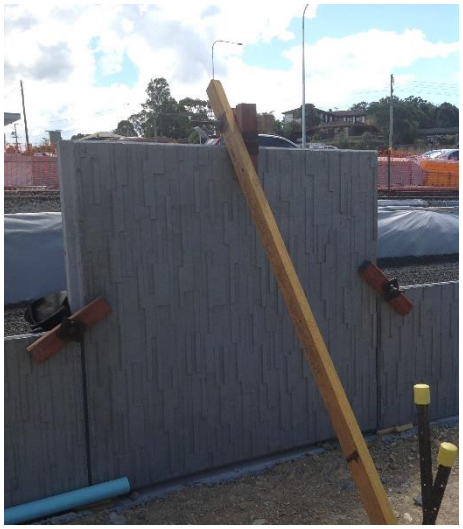
In November 2015, The Reinforced Earth Company (RECO) was subcontracted to design and supply a 297m long Reinforced Earth® retaining wall to be constructed along the similar alignment as the existing crib type retaining wall.

Challenges:
Thousands of dollars would be saved by changing the design of the retaining wall from a large precast cantilevered wall to a Reinforced Earth® soil structure. The benefits are obvious as Reinforced Earth® structures have a short construction time, pose the minimum disruption to traffic and the geometrical flexibility of the TerraPlus® concrete facing panels selected for the project make the design easy to fit when replacing an existing structure.

The topography of the area forms a gentle undulation with surface gradients sloping to the north towards the roundabout and south towards the Royal Pines Resort. No groundwater was encountered in any the geotechnical reports, however, seepage may be encountered at the fill/natural soil interface, within alluvial soils and at the soil/rock interface following rainfall events.

Concerns were raised regarding load transfers that may result from vehicle impact. Vehicles could impact the Reinforced Earth® wall directly from the lower road or from crashing into the guardrails at the top of the wall structure.

The structure is built completely from behind the facing wall therefore not interfering with access and traffic during construction. This is particularly relevant in urban areas where there is a limited right of way.



Main picture: Reinforced Earth® wall during construction
Above first picture: Reckli® 2/49 Saale panel finish
Above second picture: Placing backfill along rear of Reinforced Earth® wall

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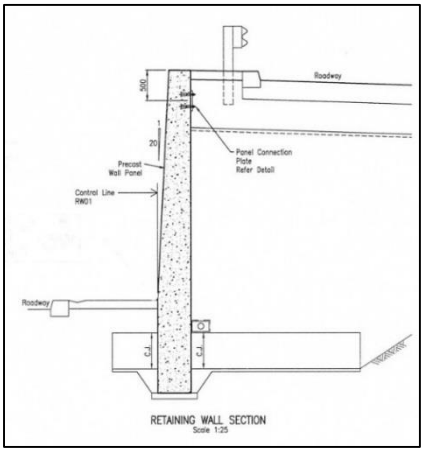

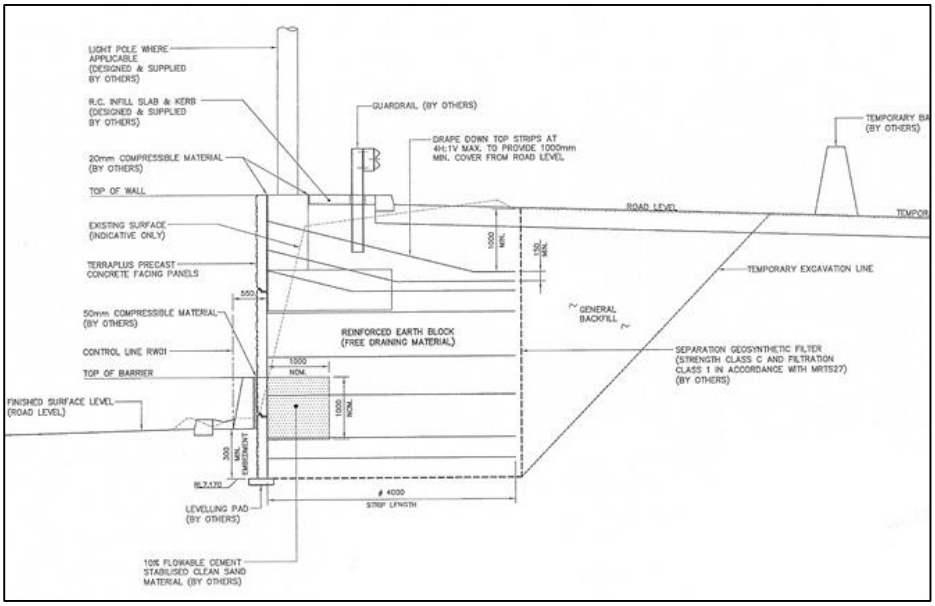

Above: Original design of the existing crib type retaining wall section.
Right: New replacement Reinforced Earth® retaining wall section design chosen for construction.

Solutions:

There is no requirement for a cantilever footing at the base which is present in the crib design. The Reinforced Earth® wall design comprises of reinforcing strips with granular backfill and reinforcing strips which are connected to the precast concrete facing. This design takes into account the external stability of sliding, overturning and the calculation of the bearing pressure of the Reinforced Earth® block. The Reinforced Earth® block is built directly onto the ground, even on poor foundation soils, and the wide foundation prevents concentrations of loads. In addition to its own weight the block transfers the effects of surcharges and earth pressures to the foundation and distributes them evenly over the entire width of the base.

A Reinforced Earth® wall requires a select, non-plastic, granular backfill material for dry land structures. The backfill is never placed with a moisture content higher than the Optimum Moisture Content limits set by our standards. Any seepage issues are controlled by the drainage properties of the select backfill.

The load transfer from the guardrail at the top of the structure was found to be negligible. The posts were located far enough away from the concrete facing panels that the Reinforced Earth® block would easily absorb any impact loads. The Reinforced Earth® TerraPlus® precast concrete facing panels can withstand certain impact loads from a vehicle from the lower road front carriageway without effecting the stability of the wall. If one or two panels get damaged, due to the segmental arrangement, the panels can be replaced. For this project, however, the client decided that there was enough room for a barrier to be placed in front of the wall to protect the panel surface.

Conclusion:

This project is designed to improve the performance of an intersection which currently carries more than 45,000 vehicles per day which is already at capacity during peak times. It will provide improved safety for motorists, cyclists and pedestrians, improve traffic flows and reduce travel times.

Project specifications

System	Reinforced Earth® retaining walls with TerraPlus® precast concrete facing
Finish	Reckli® 2/49 Saale grey concrete textured finish
Structure	Retaining Wall
Area	993 sqm (total)
Height	4.5 m (Maximum)
Length	297 Lm
Design load	20 kPa
Design life	100 years

Right: Grade Separation behind Reinforced Earth® wall

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