



CASE STUDY

Nicholson Road Bridge Over Rail Project

Perth, WA, Australia

Reinforced Earth® TerraTilt® and TerraPlus® Abutment & Retaining walls

Owner: Main Roads WA

Consultants: Arup

Contractor: CPB Contractors

Construction: May 2017 - Mar 2018

Background

Jointly funded by the Australian (\$13.7m) and State (\$13.7m) Governments, a road bridge over the railway line on Nicholson Road between Bannister Road and Garden Street in Canning Vale is now completed.

The works included:

- A six-lane road bridge over rail
- Road infrastructure including safety barriers, drainage, signs, screen/noise walls, pavement marking and street lighting
- Modifying the existing road to maintain traffic flows during construction
- Pedestrian and cycling infrastructure that includes a pedestrian underpass and a path on the east side of the new bridge.

The Reinforced Earth Company (RECO) was awarded the design and supply of the abutment walls, wing walls and other retaining walls on the project. The total of concrete facing Reinforced Earth® walls supplied for the project was 5293m². On top of this, a further 437m² of temporary Reinforced Earth® wire walls were supplied.

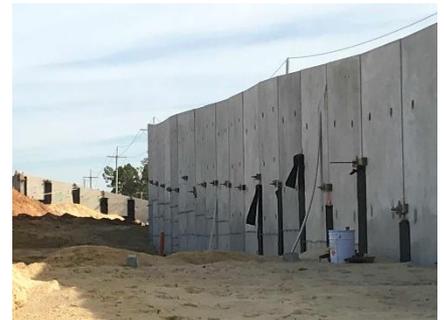
Challenges

- Geotechnical report showing large pockets of clay beneath the walls and resulting high potential for differential settlements
- Staging of works to maintain traffic flow
- Large temporary crane loadings on top of the abutments
- Reinforced Earth® walls with noise/screen walls directly on top

Solutions

Early in the design process, RECO identified the potential issues that could be caused from the differential settlement highlighted in the geotechnical report. Further site investigations and desktop studies were carried out by RECO to analyse and confirm what design requirements were needed to mitigate these issues. This resulted in a maximum retained fill height of 4m being applied to our full height TerraTilt® walls. Anything higher than this required our segmental TerraPlus® system to be applied.

To assist in the staging of the works for CPB, and allowing for continuous traffic flow along Nicholson Road, RECO designed and supplied temporary TerraTrel® wire walls. These walls enabled construction of the entire bridge structure and road whilst the installation of only one side of each abutments wing walls was underway.



Main: Completed Nicholson Road bridge with Reinforced Earth® abutments and wingwalls – courtesy of MRWA website

Above first picture: Partially completed backfill of Reinforced Earth® retaining wall with cantilevered top section (for noise/screen wall) that has no soil reinforcement

Above second picture: The same section of wall, completed.

Above third picture: Reinforced Earth® retaining walls as underpass wingwalls.



Above: Reinforced Earth® abutment walls and temporary wire walls applied to enable staged works. Seen here during the bridge beam install – photo courtesy of MRWA.

Once the roads over the bridge were complete, traffic was able to be switched and the remaining wing walls and retaining walls were constructed in what was previously the road alignment.

Because of the small project footprint, the bridge beams were required to be lifted in place by 3 cranes positioned on top of the abutments as can also be seen in the picture above. Detailed assessment was carried out by RECO engineers and the Reinforced Earth® walls were able to be designed specifically to withstand the high crane loads applied.

As an alternative to the standard noise/screen wall footings directly behind the walls, RECO was able to design the retaining walls with a 2m cantilever above the finished ground surface. This cantilevered section, supported only by the soil reinforcement of wall, was finished with a class 2 finish on both sides and was painted to become the noise/screen wall.

Conclusion

The new road bridge takes Nicholson Road over the Midland to Fremantle Freight Railway and removes the previously existing railway level crossing, enhancing safety and transport efficiencies.

Project specifications

System	TerraTilt®, TerraPlus® and TerraTrel®
Finish	Class 2, plain grey, painted on site
Structures	2 x Reinforced Earth® Bridge abutments including wingwalls, underpass wingwalls, additional retaining walls and noise/screen walls.
Area	5,293 sqm (total)
Max. Height	10 m
Design load	20kPa surcharge Crane Loading
Design life	100 years

Below Left: Reinforced Earth® abutment walls completed

Below Right: Reinforced Earth® retaining walls

