



CASE STUDY

GATEWAY WA - REDCLIFFE PARK WALL

Perth Airport and Freight
Access Project, WA, Australia

Reinforced Earth® Retaining Walls
TerraTilt®

Owner: Main Roads WA

Consultants: Gateway WA

Contractors: Gateway WA Alliance

Construction: 2013 - 2016

Background

The Gateway WA Perth Airport and Freight Access Project has created much-needed transport improvements around Perth Airport as well as the freight and industrial hubs of Kewdale and Forreestfield.

The project was awarded in 2012 to the Gateway WA Alliance, comprising 5 companies – Leighton Contractors (now CPB Contractors), Georgiou, GHD, AECOM and BG&E – working together with Main Roads WA.

In 2013 The Reinforced Earth Company (RECO) was contracted to design and supply 30 Reinforced Earth® structures which amounted to approx. 27,000 sqm of precast concrete facing panels and 1,700 sqm of WireWall temporary walls to support construction.

The Redcliffe Park Wall, featured in this study, is a Reinforced Earth® retaining wall which was built to separate Redcliffe Park from the Tonkin Highway/Dunreath Drive Interchange. This new roundabout controlled interchange will allow exits from both directions on Tonkin Highway to Dunreath Drive. It incorporates a Principal Shared Path (PSP) providing access for pedestrians and cyclists.

Challenges

The Redcliffe Park retaining wall supports the on and off ramps within the interchange. The wall is 412 m in length, of which 248 m incorporates cantilevering top sections. The top section acts as a noise wall. The wall incorporates a staircase in the centre of the structure to provide pedestrian access to the interchange from Redcliffe Park below. The staircase is supported by two additional Reinforced Earth® retaining walls which are fully integrated into the overall structure.

Over the 248 lm of the dual Reinforced Earth® / noise wall system, RECO's custom designed TerraTilt® concrete facing panels were extended above the road level to provide noise protection for resident's on the Redcliffe Park side. These dual-purpose panels reached a maximum height of 9 m. Each dual-purpose panel provides two separate ground surface levels, the lower level in the park, and the PSP level at the interchange over Tonkin Highway. The visible portions of the panels are required to be perfectly smooth on both sides in readiness for the bespoke painted finish, necessitating a rigorous precasting quality program.

The tall panels also presented a design challenge for safe installation, as they had to be designed for lifting into position and temporary bracing while construction progressed.



Main: Redcliffe Park Wall at the Tonkin Highway/Dunreath Drive Interchange, image courtesy of Gateway WA

Above First Picture: Staircase leading up to the Tonkin Highway/Dunreath Drive Interchange

Above Second Picture: The staircase during construction

Transport infrastructure



REINFORCED EARTH
SUSTAINABLE TECHNOLOGY



Above: Cantilevered Noise Wall – top part of the Reinforced Earth® retaining wall along Tonkin Highway on and off Ramps
Above Right & Below: Redcliffe Park Wall at the Tonkin Highway/Dunreath Drive interchange, images courtesy of Gateway WA

Solutions

The additional height needed to incorporate the noise wall component resulted in large wind loads, which needed to be accounted for in the temporary bracing and final design. RECO engineers used advance modelling, in addition to our in-house programs, to design for the added shear forces and bending moments presented by large panels.

A panel propping system was developed which assisted the client with constructing the walls. Panels were restrained at the base by means of a bolted connection. Two props were then attached to each panel and each prop then connected to a mass concrete block. All load cases were considered in the design which was then detailed and tabulated on the project drawings.

Urban Design

The painted finish of the wall incorporates innovative urban design and public art. According to the Gateway WA designers “the project aimed to integrate the wall into the parkland with an artwork that is representative of the community in which it resides.”

Leanne Bray, the artist and co-ordinator, spent time with local school and community groups to assist in the design concepts.



The Gateway WA Project’s overall urban design incorporates a way finding colour theme. This involves coloured way-finding cues to Perth’s landmarks of the ‘city, river and range’. This wall is in the northern zone of the project which takes its inspiration from the Swan River. Therefore, the noise walls (as pictured above) have been painted blue to reflect the importance of water to Perth’s original settlement.

Project specifications

Systems Reinforced Earth® TerraTilt® Concrete Facing Panels

Finish Patterned Concrete with Painted Finish (River Finish)

Structures Retaining Walls incorporating cantilevered noise wall and staircase

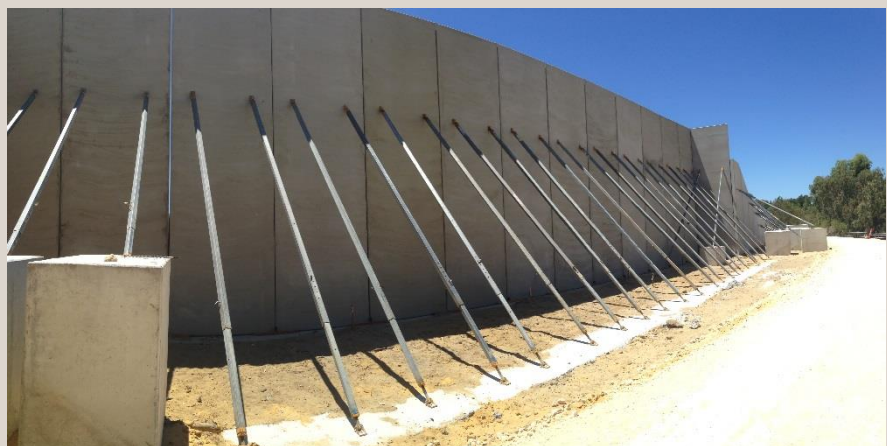
Area 2, 807 sqm (total)

Length 412 m

Max Height 9 m

Design load 20kPa

Design life 100 years



Above: Redcliffe Park Wall at the Tonkin Highway/Dunreath Drive interchange during construction