

## CASE STUDY

# PORT OF BRISBANE

Pritchard Street,  
Brisbane QLD, Australia

Reinforced Earth™ Walls  
TerraPlus®

Owner: Main Roads, QLD  
 Consultants: GHD Pty Ltd  
 Contractor: BMD  
 Constructions/BMD  
 Seymour Whyte Joint  
 Venture  
 Construction: 2012

### Background:

Port of Brisbane Motorway Upgrade known as Port Connect, extends the key corridor servicing the Port of Brisbane. The Queensland Government is upgrading the motorway as part of its long-term plan to meet the transport needs of the Port of Brisbane and the Australia TradeCoast.

With an overall estimated value of \$385 million, Port Connect will significantly improve the freight movements to and from the Port, support future growth, provide appropriate road geometry for heavy vehicles and separate heavy port-bound traffic from local traffic.

The Port of Brisbane Motorway will ultimately benefit local businesses and communities through reduced congestion, safety improvements and shorter journey times.

The upgrade will also provide economic benefits and improved connection for commercial vehicles to the Australia TradeCoast and the Port of Brisbane.

### Challenge for the Department of Transport and Main Roads:

Currently, heavy vehicles have been using Lytton Road to access the port and this has resulted in extreme congestion and unreliability for road users and freight movement.

As a result, the Department of Transport and Main Roads selected BMD Seymour Whyte Joint Venture to design and construct the Port Connect project.

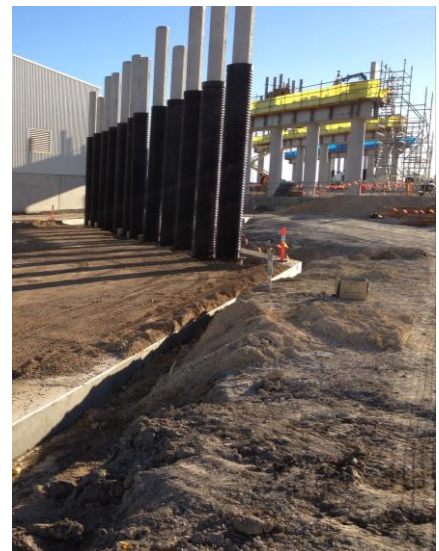
This project will deliver a duplication of the existing three kilometre motorway, as well as a three kilometre extension that will eliminate the need for heavy vehicles to use Lytton Road to access the port.

A new interchange at Pritchard Street with an overpass between Lytton Road and Export Street, will allow for local trips and provide access to the motorway.

### Design challenges, solutions and interesting features:

Port Connect lies in the Brisbane River flood plain, where soft soils are commonly found. High Reinforced Earth™ embankments proposed at the Pritchard Street overpass would suffer unacceptable long term settlements and ongoing maintenance if the soft sub-soils were not treated. An innovative design was required to ensure a structurally competent solution.

At an early stage, Menard-Bachy was engaged by Port Connect Joint Venture to design and construct the ground improvement scheme, using their proprietary system of Controlled Modulus Columns (CMC), to meet the project's



**Main picture and above:** Constructing the TerraPlus® Reinforced Earth™ walls for the Port of Brisbane Motorway Upgrade – Pritchard Street Overpass.



**REINFORCED EARTH**  
SUSTAINABLE TECHNOLOGY

Transport infrastructure



**Left:** Construction of the Controlled Modulus Column (CMC).  
**Above:** Reinforced Earth™ straps are being placed during the construction of the TerraPlus® Reinforced Earth™ walls.

stringent performance requirements.

CMC's comprise a system of unreinforced concrete rigid inclusions that are installed using a specially designed auger that displaces the soil laterally with virtually no spoil or vibration. During the auger extraction process, each column is formed by grouting under a controlled limited pressure (less than 5 bars) through the stem of the auger to achieve a predetermined stiffness ratio with the surrounding soil.

The analysis showed that the best approach was to design the embankment and its foundation as a whole system, by considering the various interactions between the sub-soils, CMC's, load transfer platform, Reinforced Earth™ engineered fill and soil reinforcing metallic strips.

To assist with this global approach to the embankment/foundation design, Menard-Bachy engaged Reinforced Earth Pty Limited (RECO) to undertake a customised Reinforced Earth™ retaining wall design.

RECO's customised design required some longer and overlapping soil reinforcing strips to reduce the ground lateral movements and subsequent bending of the CMC's, induced by earth pressures and vertical loads of the RE block above.

The global FEM analysis carried out by Menard-Bachy included all components of the system and confirmed that the designed scheme was able to support the embankment loadings and ensure settlement criteria was met.

Menard-Bachy have constructed the CMC's and RECO was contracted by the Joint Venture to supply the TerraPlus® Reinforced Earth™ concrete faced wall.

Construction of the Reinforced Earth™ walls commenced in April 2012 and will be completed in June 2012.

### Project specifications

<b>System</b>	TerraPlus® Series 2 panels
<b>Finish</b>	Plain
<b>Structure</b>	False Bridge abutment with associated Reinforced Earth™ walls
<b>Area</b>	2,740sqm
<b>Max. Height</b>	11M
<b>Length</b>	405M
<b>Design load</b>	SM1600/20kPa
<b>Design life</b>	100 years