



## CASE STUDY

### CHRISTCHURCH NORTHERN CORRIDOR

Kā Pūtahi Creek  
Christchurch, New Zealand

Reinforced Earth® TerraClass®  
Abutment walls

Owner: New Zealand Transport Agency

Consultants: CNC Alliance

Contractor: Fulton Hogan Limited – Civil South

Construction: Feb 2017 – Dec 2018

### Background

The Christchurch Northern Corridor (CNC) is a 12 km motorway extension that will provide improved options for cyclists, pedestrians, private vehicles and freight. It will reduce traffic on nearby local roads and improve safety for all road users. The CNC Alliance expects to complete this project in 2020.

Reinforced Earth Ltd was contracted by CNC Alliance to design and supply RE materials required to construct a bridge over the Kā Pūtahi Creek, one of four (4) key Reinforced Earth® structures serving this project.

This bridge allows the shared cycle/pedestrian path to underpass to the other side of the motorway and provides a cycle connection to Guthries Road.

The Kā Pūtahi Creek has been realigned and developed into a small forested wetland area.

### Challenges

A major requirement of this design is any part of the Reinforced Earth® structure founded below Q2 level (RL 14.202 m) is to be designed as permanently submerged or where permanent groundwater is assumed to be present.

### Solutions

Both structures are founded below the specified Q2 level. Retaining Wall RW2 (North Abutment) is founded at 1.40 m below Q2 level and consequently the lower two reinforcing strip layers will be permanently submerged. Similarly, for Retaining Wall RW5 which is founded at a nominal 0.84 m below Q2 level and will result in the single lower reinforcing strip to be permanently submerged. The Q100 year flood level was specified at RL 14.70 m for both abutments.



**Main picture:** Completed bridge over the Kā Pūtahi Creek, Christchurch Northern Corridor  
**Above first picture:** Site Preparation  
**Above second picture:** Placing temporary sheetpiles prior to flow diversion

Transport infrastructure



Above: Reinforced Earth® TerraClass® wall on north abutment with temporary sheetpiles on the south abutment.

### Structural Elements

The Reinforced Earth® structures have TerraClass® (S2) plain grey precast concrete facing panels - 3.43 m height on the northern abutment and 2.42 m height on the southern abutment.

Steel earth reinforcing strips: HAR, inextensible 45 mm X 5 mm nominal section, and hot dip galvanised.

The deck rests on cast-in-situ bank seats directly supported on the Reinforced Earth® abutment walls. The bridge deck comprises a single 12 m span, between abutment centrelines. The Reinforced Earth® structures are aligned perpendicular from the bridge control line.

### Design Standards

The Reinforced Earth® structures were designed to the requirements of the

- NZ Transport Agency Bridge Manual – Third Edition (BM) with Amendment No 1, and where relevant, the
  - Terre Armee International – Design of Reinforced Earth Retaining Wall Design Guides (TAI)
- and
- AS 4678-2002 – Earth Retaining Structures.

The design ULS (EQ) was 0.63 g for a 2,500-year return period event. Permanent displacements were not to exceed 70 mm.

### Project specifications

<b>System</b>	Reinforced Earth® TerraClass® precast concrete facings
<b>Finish</b>	Smooth grey precast concrete panels
<b>Structure</b>	2 Reinforced Earth® bridge abutments
<b>Area</b>	228 m <sup>2</sup>
<b>Max. Height</b>	3.43 m
<b>Std HO Loading</b>	24kPa
<b>Dead Load from Bridge</b>	5,200kN
<b>Design Life</b>	100 years