



1 Completed works 2 Temporary seismic restraint - strongback reaction frame at pier 3 Construction of congested pier headstock reinforcing around fibre optic cable, column cage extending into headstock in bottom left and top right 4 Construction of bridge structure largely complete

## Ferrymead Bridge

**Project Location:** Ferrymead, Christchurch

**Opus International Consultants for Christchurch City Council**

**Disciplines:** Bridge Engineering, Geotechnical Engineering



The original Ferrymead Bridge was extensively damaged after the 2010/2011 Canterbury Earthquakes, and given its location on a key lifeline route, needed to be replaced quickly but with a robust structure resilient to earthquakes. The bridge also provided access for numerous vital services. The bridge is located in one of the most challenging sites, with highly liquefiable ground to up to 25 m depth, underlain by steeply dipping bedrock of highly variable quality. The replacement bridge had to be designed and constructed bearing in mind the ongoing earthquake aftershocks, the need to maintain traffic and services across the site, the sensitive estuarine environment and the paramount safety of contractors undertaking the works and the public. Opus, engaged to carry out the design, conceived a two span reinforced concrete bridge supported by steel cased reinforced concrete piles, which were socketed and cement grouted into the underlying rock for strength and resilience. A well-thought out bridge form and design philosophy led to an elegant concrete structure being constructed safely and cost effectively despite the ongoing seismic activity in Christchurch. The innovative development and use of pressure grouting of the pile-rock interface using Tube-a-Manchette methods was fundamental to achieve the seismic resilience required, safely in an active seismic environment.

The risks arising from the active seismic environment were also carefully assessed and managed by programming the sequence of construction and providing temporary props to restrain the piles, until they were locked in place by the superstructure. Use of deterioration modelling, based on assessment of the previous bridge, optimised the design for durability and reduced overall costs. The design and construction required innovation and design excellence in close liaison with the contractors. These innovations led to significant cost savings for the client, Christchurch City Council.

### Judging & Copyright Statement

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