



Client

Ministry of Justice

Project overview

The Canterbury Earthquake Sequence (CES) of 2010-2011 left no New Zealander untouched and its deadly repercussions resounded around the world. Critically, it has also provided something of a blank canvas on which to create cohesive, disaster resilient infrastructure.

The Justice Precinct is a \$NZ300 million anchor project for the Christchurch rebuild located in the heart of the CBD. It is the largest multi-agency government co-location project in New Zealand's history. An estimated 2000 people work in, or use, the 42,000 m2 precinct each day.

Opened in September 2017, the building serves as the centre for all emergency and Justice agencies in the region, housing the Ministry of Justice, NZ Police, Department of Corrections, St John Ambulance, New Zealand Fire Service, the civil defence and emergency management functions of the Ministry of Civil Defence and Emergency Management, Christchurch City Council and Environment Canterbury.

As an agency of continuity, the Justice Precinct required a structural standard appropriate for an importance level (IL) 4 building. Resilience for these buildings is the most expensive and difficult to achieve - but essential for the Precinct to perform its critical post-disaster function.

Previous analysis led developers to believe that only costly pile foundations could achieve the resilience demanded. T+T proved otherwise. Our experts applied

complex, cross-discipline insight to deliver an elegant, cost-effective foundation solution which also resolved the site's contaminated soil issue and cut overall project costs by \$600,000.

The foundations comprise a concrete slab atop a 2.5 metre thick cement-stabilised ground improvement platform designed to mitigate the risk of foundation damage from liquefaction, allowing for base isolation of buildings and enabling post-disaster function of the building to be maintained following large earthquakes.

Cement stabilisation was completed using an "ex-situ" technique. Soil was excavated, mixed with 8.5% cement by weight in a pug mill, then placed and compacted back in layers. Key design criteria were strength (measured by UCS tests), compaction (measured by NDM tests) and stiffness (measured by in-situ CBR tests). Using 8.5% cement, the in-situ silts and sands were able to achieve UCS > 1.0MPa, density > 95% MDD and CBR > 50.

Incorporating the retained contaminated soils into the raft foundation stabilised the contaminants and afforded considerable savings by removing the necessity to dispose of contaminated soils and reducing importation of material required for the raft. Additionally, it eliminated the costs and delays of characterising unexpected contaminated soils as they were encountered.

During the consenting process, T+T took the innovative approach of applying for a discretionary consent with the DSI (UK Phase 2 investigation) as a condition of the consent, rather than undertaking the DSI prior to lodgement. This enabled soil sampling while the consent was being processed and, as works were underway, moved completion forward by an additional 2-3 months.

Exceptional thinking together

www.tonkintaylor.co.nz



Expertise and services provided by Tonkin + Taylor

T+T's services included:

- Geotechnical engineering: Site investigations, groundwater monitoring, liquefaction assessment, lateral spreading assessment, ground improvement design, foundation modelling, earthworks and ground improvement specification, construction monitoring
- Civil engineering: Assessment of existing infrastructure, stormwater, sewer and water supply design, coordination of consultants, project management
- Environmental engineering: Desktop study of historic sources of land contamination, contaminated land investigation, sampling and laboratory testing, and resource consent applications

