

Grout Injections Improve Earthquake Resilience For Christchurch Apartment Building

PROJECT PROFILE

Y17M001

mainmark



INDUSTRY

Residential

STRUCTURE

Residential apartments

PROBLEM

Ground strengthening and releveling to achieve 100% NBS

LOCATION

Christchurch, New Zealand

DURATION / YEAR

5 weeks / Dec 2017

TECHNOLOGY

JOG, Teretek®

BUSINESS UNIT

Mainmark New Zealand

Summary

After purchasing an iconic eight-storey residential apartment building in Christchurch, new owners KCRB Ltd undertook seismic strengthening through ground remediation works.

Since the 2010 and 2011 earthquake events, widespread liquefaction has affected building foundations across Christchurch and the wider Canterbury region. Introduced in 2017, New Zealand's Building (Earthquake-prone Buildings) Amendment Act 2016 categorises seismic risk of a building under the New Building Standard (NBS). By working towards achieving 100% NBS, property owners can ensure the ongoing resilience of their buildings and future safety of occupants during seismic events.

KCRB Director Bruce McDonald sought to achieve 100% NBS, and engaged geotechnical and structural engineers to analyse both the building and underlying ground conditions.

The analysis identified there was adequate ground stability bearing capacity to proceed with re-leveling the building, which had suffered differential settlement due to the earthquakes. It was also decided to widen and strengthen the building's foundations.

Mainmark was contracted to undertake ground remediation and re-leveling works, and was selected due to the organisation's experience and expertise in delivering ground improvement and liquefaction mitigation solutions to structures of all sizes, including the 33,000 tonne [Christchurch Art Gallery](#).

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Objectives

Mainmark was required to strengthen the ground beneath the wider structural foundations and return the eight-storey building to level, achieving overall tolerances of +/- 10mm across the entire footprint. The ground remediation and re-levelling works were a crucial step toward achieving 100% NBS. The building's lift shaft also needed to be leak-sealed to prevent water ingress.

Solution

After assessing the ground conditions and the site's structural requirements, Mainmark recommended using JOG Computer-Controlled Grouting (JOG) solution to strengthen the ground and re-level the apartment building.

JOG is an advanced and precise method for returning foundations to level, providing precise, incremental amounts of lift. It works by improving the soil beneath the foundations and delivering accurate, computer-controlled re-levelling, regardless of building size or complexity.

The multiple JOG grout injection points are positioned non-invasively and are controlled using a central computer with finite control. This process allows the structure to be raised evenly and with pinpoint accuracy, to gently bring the building back to level while avoiding undue stress on the building.

Slab re-levelling works were completed using Mainmark's Teretek® engineered resin injection solution, which was identified as an ideal solution to under-seal the ground floor slab in order to obtain the required Damp Proof Membrane (DPM) reinstatement.

In a process that is likened to keyhole surgery, Teretek is injected through small, carefully selected points in the structure's floor. The resin quickly expands upon entry, immediately filling any voids. Like the JOG solution, this process is fast, clean and unobtrusive.

Mainmark worked around the clock to complete the project before Christmas 2017, successfully and efficiently re-levelling the building to within the required tolerances, and helping to achieve 100% NBS.

Extensive renovations of the apartment building followed the ground remediation works, resulting in a rejuvenated and structurally stronger building.

Bruce McDonald was impressed with the steps taken by Mainmark to achieve this outcome within the required timeframe. *"Nothing was a problem for Mainmark. They were incredibly cooperative and worked at a great pace, including one 7-day week, to get the project finished by 22nd December. This enabled KCRB Ltd to undertake crucial work over the Christmas period and stay on schedule to complete the project in 2018".*