

# School Building Foundations Strengthened

## INDUSTRY

Council

## STRUCTURE

School building

## PROBLEM

Earthquake remediation

## LOCATION

Christchurch, New Zealand

## DURATION / YEAR

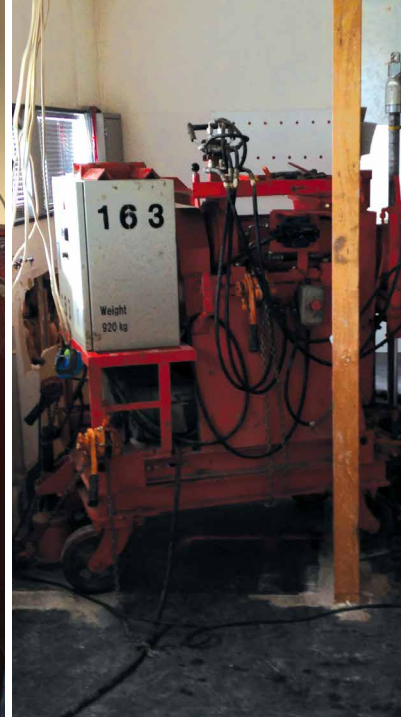
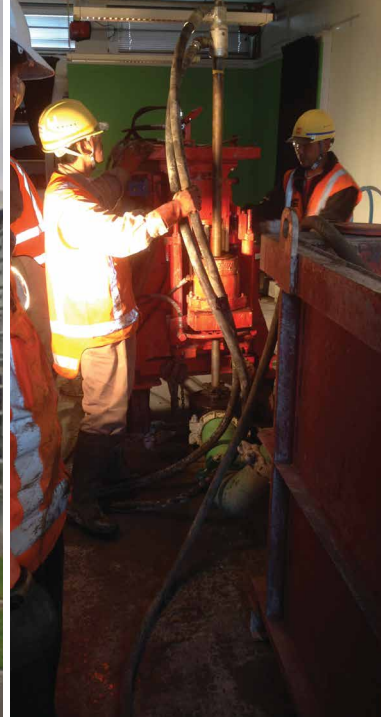
21 days / 2014

## TECHNOLOGY

Jet Grouting

## BUSINESS UNIT

Mainmark New Zealand



## Summary

This 2-storey structure of mostly tilt slab construction had suffered earthquake liquefaction and subsidence.

Jet Grouting was used to strengthen the foundation ground to provide a stronger and more stable base for subsequent void filling and improvements to the footings.

This way the school building was provided with much greater resistance to future possible earthquakes.

## Objectives

To greatly strengthen the entire foundation of the building to provide the building with a deep-soil reaction matrix and minimise the potential for future liquefaction that might cause subsidence and /or damage the structure.

## Solution

Across the building footprint of 40x12m we installed 22 jet grout columns, all 2.4m in diameter with start (toe) depths ranging from 3.2m to 4.5m.

The columns were varied in height from 2.5m to 3.8m. These columns are a mix of cementitious grout and in-situ soil.

There were finished 0.7m below ground level for subsequent connection to the existing footings of the building.

The total Mainmark project took 21 days with actual column installation taking eight days.

The school's engineers judged that the Jet Grouting had "significantly reduced the chance of liquefaction or settlement of this building in future earthquakes.

Above, left: Constructed in 1997, this Christchurch school building settled, from liquefaction of the foundation soils, due to the earthquakes in 2010 & 2011. Above, middle: Mainmark technicians and engineers carried out jet grout injection from very confined spaces. Above, right: The site was kept remarkably clean, especially as the liquid waste materials being pumped directly from the drill stems to outside holding tanks.