

Automated Remote Monitoring for Earthquake Recovery Work

Toms Brent and Doherty Callum (New Zealand)

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SUMMARY

The series of earthquakes to hit Canterbury, New Zealand in 2009 and 2010 caused widespread damage and also loss of life. Amongst the worst affected areas was the Port Hills, where there was rockfall, cliff collapse and damage to dwellings

One such area on the Port Hills was Deans Head, which was identified as a hazard area, and the dwellings in this area were required to be demolished. To allow the demolition to occur as safely as practical, the engineers needed information about the on-going stability of the Deans Head. Part of the solution to this was an automated remote monitoring system which provided real-time information about movement.

The final solution was a fully automated robotic total station mounted on a pillar inside a customised steel container approximately 500m from the site. The site is remote from services, so was required to be self-sufficient for power and communications. As the system is unmanned, the data and communication systems was required to be accessed and analysed remotely by the operators. A number of issues had to be worked through for site selection, servicing, and data transmission, analysis and reporting.

Working with the engineers, we confirmed the requirements different levels of notification for movement and implemented an SMS alert system and various trigger levels of movement. There are approximately 40 prisms on the monitoring site which are measured (in rounds) approximately every 20 minutes, as well as control prisms located independently. Geomos software is then used to gather the data via radio transmission for the total station, provide analysis of movement and send alerts as

required.

A period of observations was undertaken to prove a baseline measurement to the monitoring points, and once established we were able to report of differences from the baseline. Observations to the monitoring points have shown a cyclic pattern and we are analysing the different influences on this such as atmospheric refraction, temperature, tides and other influences to further refine the data.

Discussions with the engineers has refined the data reporting and analysis, and this has then formed part of the overall package of information that the engineers are receiving. A simple daily report is issued by email to the overall project team to confirm the status of the site, along with a more detailed report weekly which also provides graphical reports on the movement.

The system is currently providing data measurements 24 hours a day.