

# Virtual Reconstruction - the Resurrection of the Lyttelton Timeball Station in a Digital Space.

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**Key words:** Engineering survey; History; Laser scanning; point cloud, heritage, reconstruction, virtual

## SUMMARY

With so much built heritage lost during the Christchurch earthquakes, it is a privilege to work alongside Heritage New Zealand Pouhere Taonga on the faithful reconstruction of the iconic tower of Lyttelton's historic Timeball Station.

The unique nature of this project has pushed the available point cloud data to its limits, driven the development of unique new analysis tools, utilised web-sourced imagery and ultimately benefitted from a great deal of luck.

Following the February 2011 earthquake, the severely damaged remains of the Timeball Station were scanned by Archaeological Solutions as a record, never anticipating the application that would ensue for the data. The original scan data had to be captured from a distance and from very limited viewing angles due to safety concerns, impacting its completeness and accuracy. The major earthquake in June 2011 caused the tower to collapse completely, compromising the careful deconstruction and material salvage that was in progress. The rest of the building was subsequently demolished, leaving only the foundations and parts of the ground floor.

The Beca Survey Team was commissioned in 2014 to scan the site and the foundations in preparation for the design phase. This commission was extended to scan salvaged stone pieces to help the project team save time by avoiding hand measurements and the associated potential for errors. In 2015 each individual facing stone was laid out on the ground, scanned and documented. These limestone pieces were not originally cut to a uniform size and most are quite unique. Our task was to identify, match and place each stone back in its original position to facilitate a virtual rebuild of the tower – a subtle and complex 3D jigsaw puzzle. The project required painstaking digital measurement of every stone and the development of specific software to help with the analysis.

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In addition to the stonework, the critical mechanical workings of the Timeball equipment were scanned on the ground and virtually reconstructed to determine their original position within the tower – a process that ultimately relied on the fortuitous availability of a single photograph of the rubble following the collapse of the tower.

This paper will outline the methods for measuring the original structure stone by stone, how we analysed the data and present a view of the virtual tower, ready for this historic building to be re-created on the site.

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