

Reducing the gap between analysis and performance – load testing of a 19th Century timber framed church

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**2014 NZSEE
Conference**

ABSTRACT: St Andrew's church at Rangi Ruru was originally constructed circa 1857 and is registered as a Category 1 building on the Historic Places Register and Group 1 on the Christchurch City Plan. The church, constructed from timber frames and roof trusses performed well throughout the recent Canterbury earthquakes.

In this paper we discuss the approach to the initial assessment of the building capacity and the need for physical load testing to reduce the gap between analysis and performance.

The lateral load resisting system of the church is dependent on the capacity of timber connections. The capacity of these joints is difficult to assess accurately by analytical methods and tend to give conservative values of %NBS. Therefore, a full scale load test was carried out to provide a %NBS that was more consistent with the observed performance. We will present on the instrumentation used to collect data and the load testing methodology developed for measuring both seismic and wind loads.

We will compare the results from our analytical model and data from physical load testing, and draw conclusions on the validity of our assumptions when analysing structures of a similar nature. It is hoped that the findings from this paper will aid with the assessment and strengthening of similar timber framed churches nationally. Seismic strengthening options will be briefly discussed.