

# Base Isolation Design Issues of Ryman Retirement Complex in Petone, New Zealand

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## Abstract

New Zealand was a pioneer in the development and application of base isolation technology, but its application started decreasing in the 1990's. The Christchurch earthquake series of 2010 and 2011 highlighted the need for additional seismic resiliency within the New Zealand building stock. This paper overviews the design and construction of a Ryman Healthcare retirement facility in Petone, New Zealand. There are four base isolated buildings on the site near the Pacific Rim fault that runs along the east coast of New Zealand. Liquefaction and high water table issues further compounded the design challenge. The buildings consist of precast concrete shear wall superstructure over a lead rubber bearing (LRB) and PTFE friction slider isolation system at the parking level. The paper details the design trade-offs in this unusual near fault application that resulted in a relatively high yield level design to control the displacements. A comparison is provided with the detailed non-linear time history results and the simplified design procedures incorporated in the new ASCE 7-16 design provisions. Additionally, the innovative construction methods and structural detailing used on this project are highlighted, including the development of custom precast shell beams.

In addition to the Petone project, base isolation has been utilized in the rebuild of a number of high importance buildings in Christchurch. Now under development, there were no New Zealand code requirements or design guidelines available at the time these structures were designed. A discussion of a number of important issues that were identified during the peer review of four of those projects is presented. These include the lack of clarity in the displacement region of the NZ code spectra beyond 3 seconds, the use of ASCE 7 (100% QC testing) or Euro Code (20% QC testing) isolator testing requirements, and the definition of an MCE event.