Seismic Assessment and Strengthening of the Majestic Centre, Wellington, New Zealand

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ABSTRACT: *The Majestic Centre is located in central Wellington, New Zealand. Constructed circa 1991, the building comprises a 25 storey tower above a five storey podium. The tower has a dual lateral load resisting system; a perimeter reinforced concrete moment frame and two central shear cores.*

Following the Canterbury Earthquakes, the building's owner, Kiwi Property, commissioned seismic assessments of their property portfolio. An Initial Seismic Assessment (ISA) of the Majestic Centre was followed by Detailed Seismic Assessment (DSA, 2011) of the structure using both modal response spectrum (MRSA) and non-linear time-history (NLTHA) analysis methods.

NLTHA and performance based assessment methodology concluded a seismic assessment rating in the range 35-45%NBS which, whilst above an Earthquake Prone threshold, identified a number of critical structural weaknesses (CSW's). This was considered inconsistent with the building's 'Grade A' office status and posed a risk to the building occupants and the surrounding Wellington CBD.

CSW's identified include; L5 transfer beams, shear core foundations, non-ductile shear core walls, tower diaphragms, precast cladding panel connections, podium roof load paths and seismic displacements and tower floor related issues associated with 1980's precast flooring detailing. These issues will be covered in further detail as part of this paper.

Design and construction of strengthening works progressed in parallel from 2012 whilst maintaining a fully tenanted building. The project will be complete in Q3-2016.

This extremely ambitious and challenging project, undertaken by Kiwi Property and their consultant and contractor team has served to demonstrate that seismic strengthening of large commercial buildings 'in-service' is possible provided owners, designers, contractors, regulators, and tenants are willing to work together.

This paper aims only to provide an overview of the assessment, analysis, design and construction processes from a Structural Engineering perspective.

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