

# Liquefaction Assessment of Reclaimed Land at CentrePort

Riwaj Dhakal<sup>1</sup>, Misko Cubrinovski<sup>2</sup>, Jonathan D. Bray<sup>3</sup>

<sup>1</sup> PhD Candidate, University of Canterbury, Christchurch, New Zealand <sup>2</sup> Professor, Department of Civil and Natural Resources Engineering, University of Canterbury, Christchurch, New Zealand <sup>3</sup> Professor, University of California, Berkeley, California, The United States of America

## ABSTRACT

The 2016  $M_w$ 7.8 Kaikōura earthquake caused widespread liquefaction in the port of Wellington (CentrePort), New Zealand which produced substantial lateral ground movements along with global and differential settlement. Observations of liquefaction-induced damage provide an opportunity to evaluate the applicability of widely used state-of-the-practice simplified liquefaction evaluation methodologies on the end-dumped gravelly fills and hydraulically-placed silty and sandy fills at CentrePort. Liquefaction assessment of the gravel reclamation poses several challenges due to its large percentage of gravel-sized particles making it difficult to obtain high-quality in situ data using conventional penetration tests. The hydraulic fills at CentrePort are also of significant interest as they relate to a range of issues in the simplified engineering assessment around effects of fines and their plasticity on the liquefaction resistance. Detailed damage inspections after the Kaikōura earthquake involved accurate measurements of ground deformations, well documented damage to structures, and good mapping of surficial evidence of liquefaction around the port. Subsequent fieldwork included 121 cone penetration tests, several shear wave velocity profiles, and logging of boreholes with soil samples collected from around the port. These investigations are utilised to develop detailed subsurface soil profiles and spatial distribution, thicknesses, and depths of the reclamations. Results of CPT-based liquefaction triggering and post-liquefaction reconsolidation settlement assessments using state-of-the-practice procedures are discussed and compared with observed liquefaction manifestation and settlements.

*Paper 4 – NZSEE conference paper title (if it would continue to a second line, truncated and ending with) ...*