

QuakeCoRE NZSEE Conference Workshop

Large Scale Structural Testing – Future Research & Practice Needs

Holmes

Presented by Stuart Oliver
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Introduction

Current knowledge gaps:

Enhanced detailing to enable non-structural partitional walls to have a reasonable deformation capacity ($> 0.75\%$ building drift) while still reliably retaining their passive fire ratings and acoustic properties.

Still concerns in the industry 'we haven't got return the wall details right'.

Lack of test data on service penetrations through fire rated partitions.

Partition walls in health care facilities have specific hygiene requirements to consider.

Large scaling testing benefits:

Validation of enhanced partition wall detailing.

Seismic Restraint of Ducts and Cable Trays

Current knowledge gaps:

Concerns exist in the industry that NZS 4219 and NZS 1170.5 are nonconservative in terms of design loads for the design of seismic restraints for services. Both standards recommend the use of load reduction factors when calculating ULS seismic loads for bracing members i.e. assumes ductile response.

While NZS 4219 provides guidance on how far pipes can span between seismic restraints, similar information is not provided for ducts and cable trays.

Large scaling testing benefits:

Increased confidence existing design standards are delivering adequate performance to satisfy NZBC requirements.

Provide needed performance data for ducts and cable trays.

Precast Concrete Cladding Panels

Current knowledge gaps:

Recent changes to NZS 1170.5 (Amd 1) and NZS 3101 have significantly increased design requirements for precast concrete cladding panels:

- Increased vertical accelerations (Uncited). For IL 3 building in Christchurch = 1.8g
- 1.5 x ULS drifts. ± 125 to 140 mm common.
- Amplified design requirements for shallow embedded anchors.

Recent testing has been completed at UoC for short pre-cast panels with high aspect ratios. Similar testing yet to be completed for longer panels i.e. 8 m– 10 m long.

Large scaling testing benefits:

Increased confidence detailing used for precast concrete cladding panels is adequate. Will likely need to be on a shake table i.e. combination of panel inertia forces and deformation demands from supporting building.

Unreinforced Masonry Veneer

Current knowledge gaps:

Demand in the industry for use of unreinforced masonry veneer for high density houses.

NZ Standard limits use of unreinforced masonry veneers to 2 storeys or less.

Large scaling testing benefits:

Validation that unreinforced masonry veneers are appropriate for buildings > 2 storeys.

LDSD Strain Limits for Encapsulated G500E Reinf

Current knowledge gaps:

Firm guidance on reinforcement strain limits which can be used to design conventional reinforced concrete LDSD structures does not exist.

Large scaling testing benefits:

Increased confidence in the construction industry that conventional reinforced concrete structures can be economically designed and detailed to sustain numerous significant earthquakes before invasive repairs are required to reinstate damaged encapsulated reinforcing.

Global Stability of BRBs

Current knowledge gaps:

Significant amount of on-going research into the global stability of BRBs subject to in-plane and out-of-plane loads/deformations.

Very limited large-scale testing has been completed to evaluate and validate the various design procedures proposed.

Large scaling testing benefits:

Validation of design procedures so they can be used with confidence by construction industry.



Thank you