



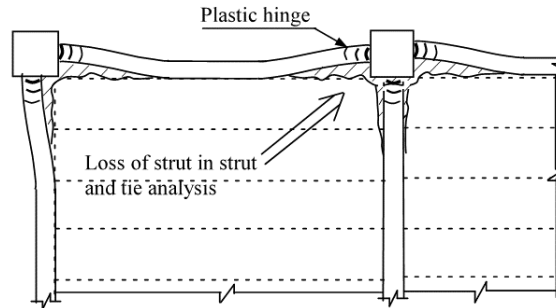
DT2: Whole-of-building Seismic Performance

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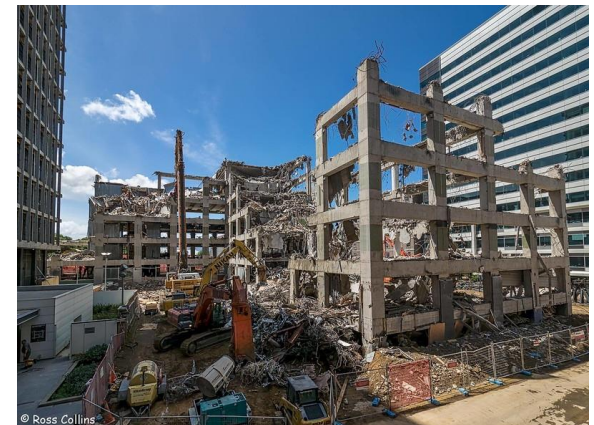
Recent Examples



- Precast floors



- Repair costs for non-structural components



- Criticism of “low-damage” systems

Resilient or Repairable Buildings



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1. Structural components

Structural disciplinary Theme: “Whole of building seismic performance”

2. Structural systems (more than components)

3. Entire buildings (more than structural system)

Inter-disciplinary programmes

4. Clusters of buildings (more than 1 building)

5. Cities and communities (more than buildings)



Research Questions



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- How do component interactions ignored during design affect the seismic response of buildings?
- What damage occurs due to component interactions in existing buildings?
- What novel solutions can be used to mitigate the effects of component interactions in new buildings?
- What are the demands imposed on non-structural components either from earthquake shaking or interaction with structural components?
- How does improved understanding of whole of building response effect the seismic performance and loss estimates across a range of hazard levels / limit states?

- Whole of building
 - Consideration of structural-to-structural component interactions as well as non-structural components.
- Whole of life design
 - Consideration of performance objectives and all limit states and costs associated with damage to various components.

Theme	Focus area	Large-scale testing and monitoring	Numerical modelling	Design and implementation
Whole of building	Vertical – Horizontal system interaction	1.1	1.2	1.3
	Diaphragm behaviour and demands	2.1	2.2	2.3
	Non-structural systems	3.1	3.2	3.3
Whole of life design		4.1	4.2	4.3

Horiz-Vert System Interaction

- Wall-to-floor interaction (RC, PT, timber walls)
- Coupled and core wall systems
- Precast concrete buildings (industrial + multi-storey)
- Braced frames (EBF + CBF + rocking)



Diaphragms

- Existing buildings:
 - Precast concrete – [Recast]
- New buildings:
 - Composite steel tray floors
 - Post-tensioned slabs
 - Timber CLT

How?

- What can be tested in the lab?
 - Connections
 - Sub-assembly
 - Whole buildings [friends...]
- What can be modelled?
- What test data is available to validate models?
- What data can be obtained from instrumented buildings or field testing?
- What aligned funding (existing or new) can we access?

