Seismic resilience estimation of low-damage building systems

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Funding:

Chinese Scholarship Council (CSC)

(Under application, the result will be announced by the end of July 2021)

12 months in New Zealand

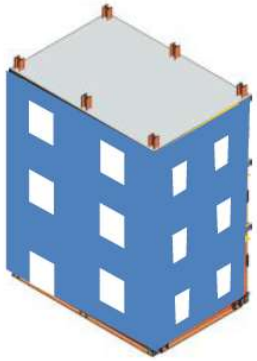
(Depends on New Zealand border)

ILEE ROBUST project

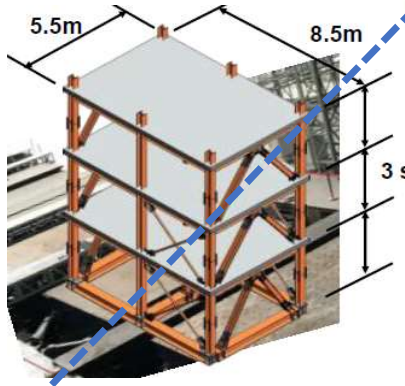
Full-scaled shaking table tests on **Low-damage Building System**

Resilience Rating (ILEE)

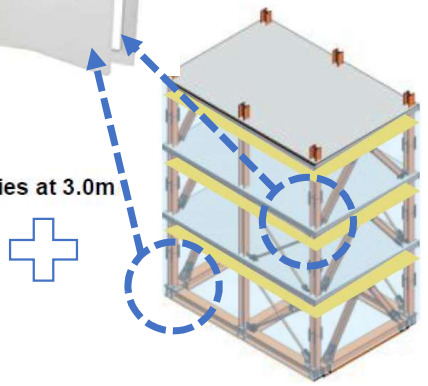
Goal



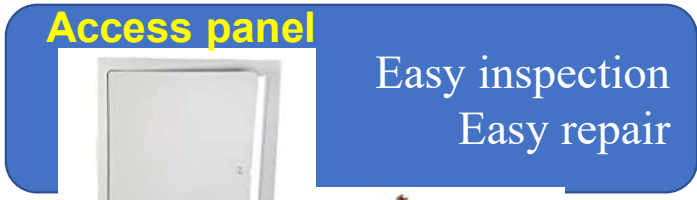
Low-damage Building System



Resilient Structure



Resilient Non-Skeletal System



Quantitative requirements for **Platinum** rating (*2500 years*):

- Loss limit: Repair costs < **10% of component cost**
- Downtime limit: Recovery < **3 days**

Useful Information from ROBUST Programme

Low-damage Building system damage expectation

- *"Engineering demand parameter(EDP) –damage measure(DM)" relationship (we hope for no damage/loss!)*

Damage effects

- *Easy method for damage inspection (without causing damage!)*
- *Damage decision (based on damage experienced) – leave, repair*
- *Repair/replacement downtime and cost estimation*

*ROBUST will use **access panels***

Fragility database of low-damage construction

Repair cost and time database of low-damage constructions

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*We want a **high confidence** of **high probability** of maintaining functionality*

Use relationships from ROBUST, including IM-EDP, EDP-DM, and DM-downtime/cost

For a case study building:

❖ **Considering variability (aleatory uncertainty)**

With and without **Access Panels (considering the cost)**

Quantify loss and downtime

- Median and **variation** in these values
- EAL
- Resilience index
- Lifecycle costs
- Allowing statement "In a certain event/time, the **probability of a loss more than 10% of the building value, is less than 40%**"

❖ **Considering modelling assumptions (epistemic uncertainty)**

With and without **Access Panels**

Considering modelling uncertainty

- Allowing statement "In a certain event/time, there is a **60% level of confidence** that the probability of a loss more than 10% of the building value, is less than 40%. "

❖ **Such studied may be conducted for different systems**

This work provides support for building developers and engineers to build practical low-damage buildings
As well as providing a general tool, the benefits of access panels will be assessed.

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Thank you ！