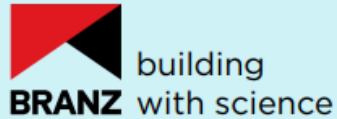


Seismic Resilience of Residential Houses



- **Our strategy**
- **Research drives**
- **BRANZ projects currently underway**
- **Intended research outcomes**
- **Open discussions**
- **Collaborations**

BRANZ Strategy



OUR ASPIRATION Affordable, resilient, sustainable and quality buildings for Aotearoa New Zealand

Our focus



Affordability

Housing is affordable for people to build, maintain and live in



Resilience

Buildings protect people from earthquakes, fire, extreme weather and climate change



Sustainability

Buildings are environmentally designed, built, maintained and recycled



Quality

Buildings are safe, warm, dry and fit for future generations

We will succeed by

Focusing on the issues that matter

Being an **independent, sought-after expert** with a clear vision for the future

Strengthening our revenue base to support long term investment and impact

Empowering **high performing** people, systems and capabilities

Our purpose

- To be a trusted, independent expert in building and construction
- To provide practical research, testing, assurance and expertise to improve New Zealanders' lives

Our foundations

Trusted expertise
We bring more than 50 years of independent knowledge and a focus on the future

Practical solutions
We develop accessible evidence-based solutions, testing and assurance to support better buildings

Collaboration
We work in partnership with others to create impact and improve lives

System wide influence
From industry, to decision-makers, to all New Zealanders - we work across the entire system to influence change

Initiatives: Earthquake damage evidence

In Canterbury earthquakes

- 1. All light timber framed (LTF) houses achieved life safety, but huge cost**
- 2. Highlighted vulnerable house stocks**



Houses with hybrid bracing systems



Hillside Houses

Our projects Currently underway

- **Seismic behavior of LTF houses with hybrid bracing systems**
- **Seismic behavior of LTF hillside houses**
- **Damage controlled design of LTF houses**

Research progresses : Hybrid LTF houses

- Investigated at an elemental level:
“Why did the inclusion of hybrid bracing systems exacerbate the damage?”
- Identified the causes and developed a solution
- With collaborators, produced guideline for professional engineers and BCAs to use. Widely used now

Intended outcomes:

- Engineering dataset of common bracing systems for engineers to use
- Based on evidence, guideline developed for bracing designs of hybrid LTF houses
- Design examples of hybrid LTF houses

Research progresses : Hillside LTF houses

- **Characterized the common practice (literature reviews)**
- **Hypothesis of likely seismic vulnerabilities of hillside houses (desk-top studies)**
- **Tested subfloor systems commonly used in hillside houses**
- **Yet to develop retrofit solutions and guidelines**

Intended outcomes include:

- **Diagrams, sketches for improving hillside house performance**
- **Design examples for engineering professionals**

Research progresses : Damage controlled design



Desktop and experimental studies have been conducted at a systems level, identifying shortcomings of current LTF construction standard, namely:

- **Different test procedure for bracing walls on suspended timber floors**
- **Plasterboard bracing walls have much lower energy dissipating capacities than currently assumed.**
- **Current irregularity limit is too lenient.**
The new NZS3604 expected to change
- **Continue the damage quantification work for common structural systems**

Intended outcomes:

- **A guideline for 3-storey LTF houses**
- **A design example of a 3-storey LTF house**
- **Informing future LTF design standard**

Other issues about seismic resilience of houses



- **Impact of NEW TS1170.5 on house construction, especially for Wellington**
- **Soil-foundation-structural interactions**
- **Land-sliding and flooding (work with Earth Sciences Institute on landsliding)**
- **BRANZ's project about flooding. Effect of flooding on the condition of houses.**

We want to engage with people like you!



- **We need your input to deliver useful outputs – common practice, topology classification, common details**
- **We can work together to achieve better outcomes**
- **Contact detail: Angela.liu@branz.co.nz**