MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HIKINA WHAKATUTUKI

The Construction Clients' Group Wellington
Wednesday, March 25

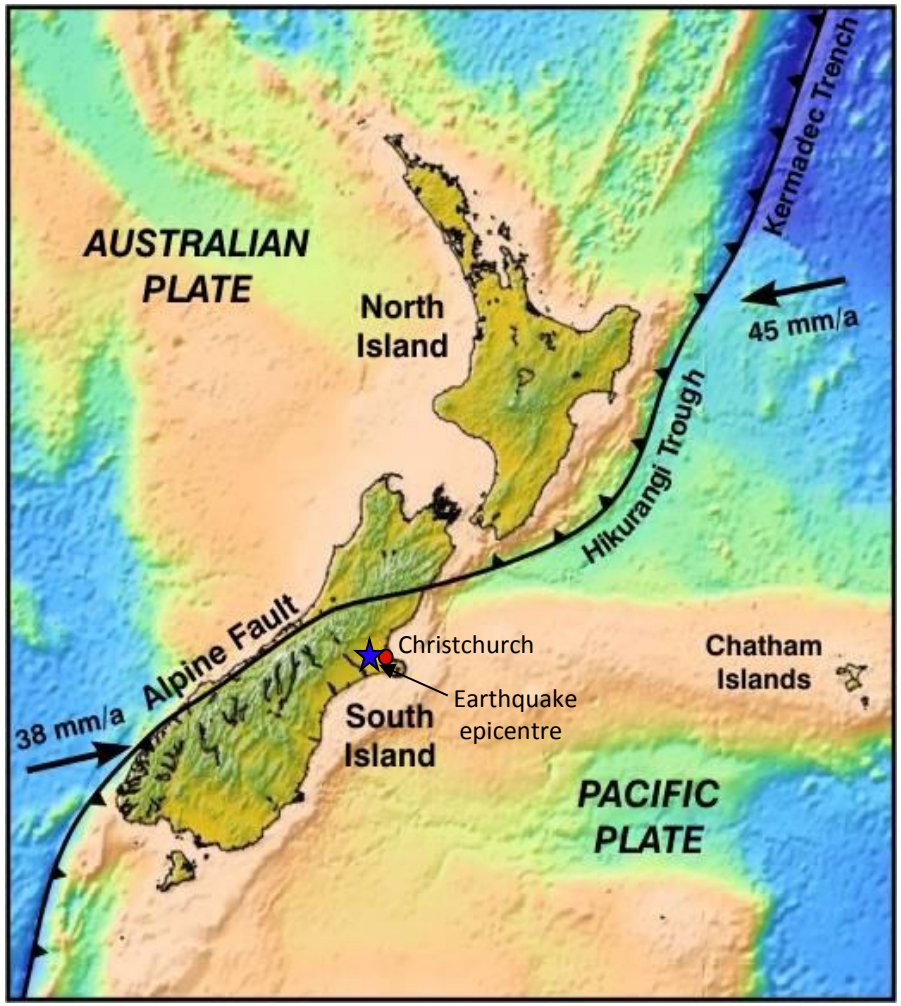
Government's view of earthquake resilience

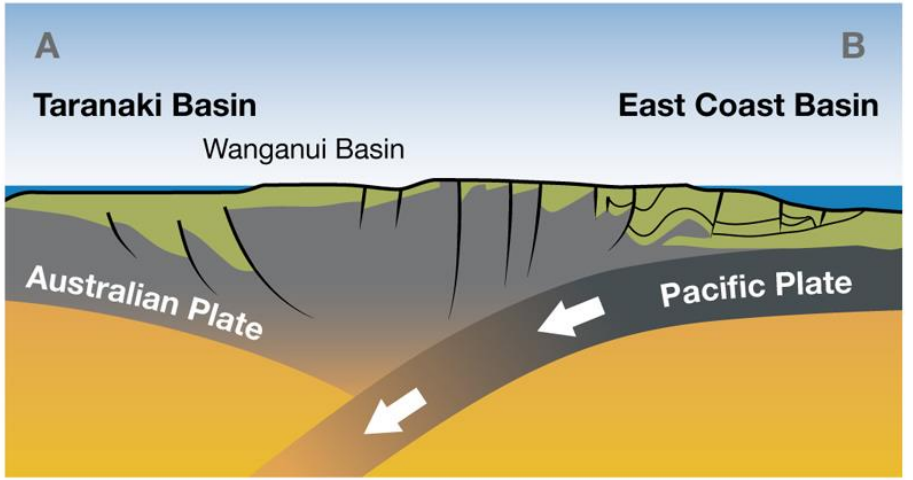
Mike Stannard, Chief Engineer

You never let a serious crisis go to waste … it's an opportunity to do things you think you could not do before

Rahm Emanuel – American politician and 55th Mayor of Chicago

New Zealand is vulnerable





23 January 1855

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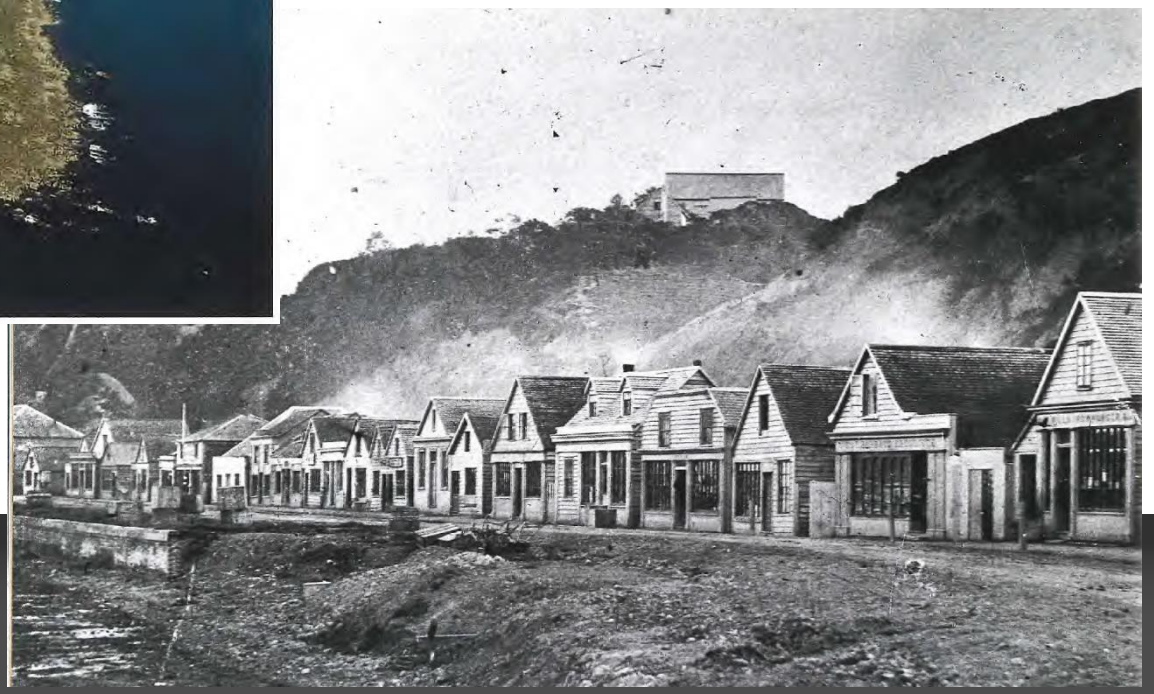
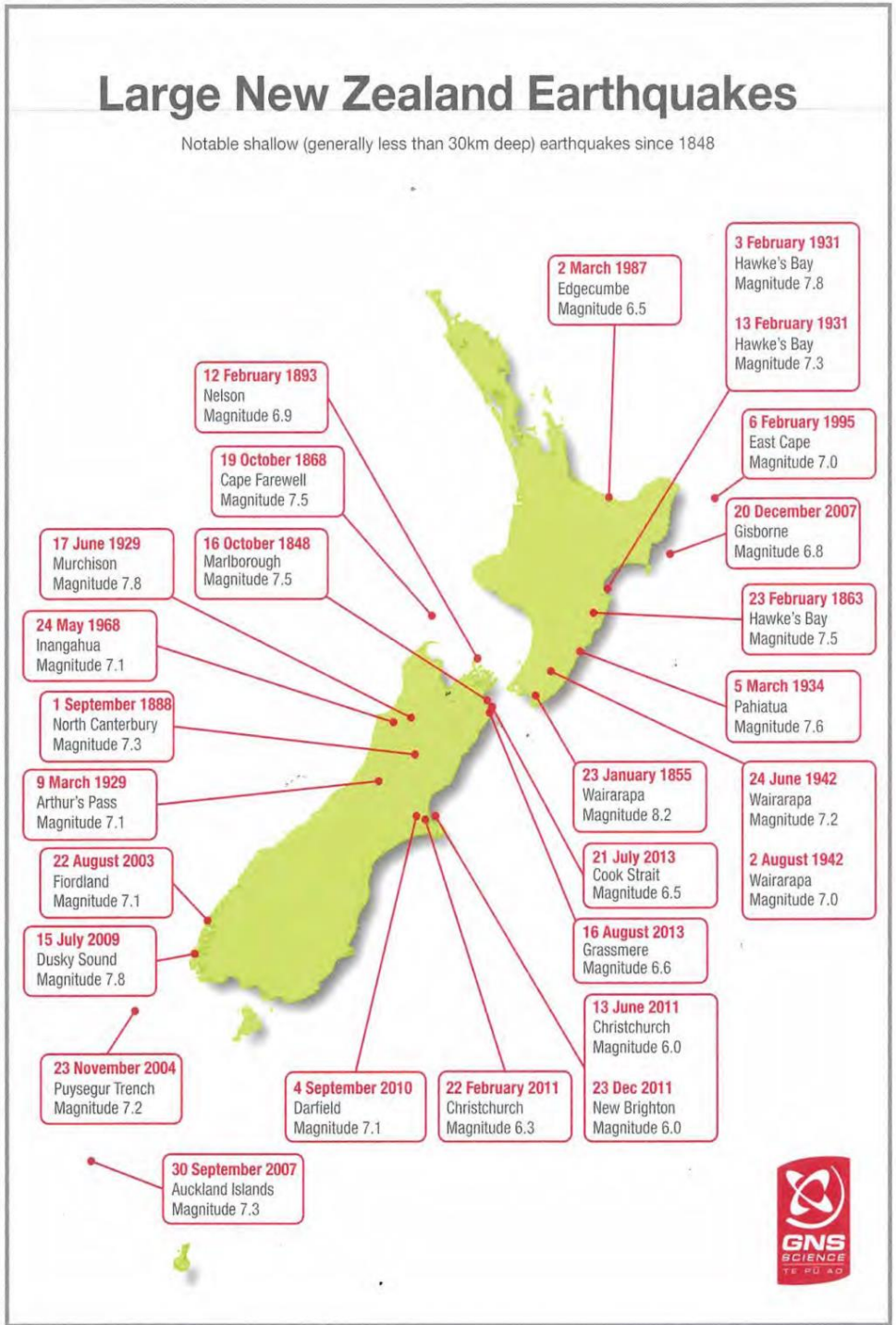


NZ Earthquakes

Murchison 1929
Napier Nurses Home 1931



The Canterbury Experience

Fatalities – 185 (11,000 injured)

Cost – Estimates up to $NZ40 billion ≈ 20% GDP, ($US35B)

Insurance – one of biggest insurance claim events in world, > 450k residential claims for 170k houses

Christchurch CBD – 1700 commercial buildings demolished

Events – > 14,000 shakes, on-going nature, highest ground motions


L'OREAL
PARIS


CTV Building Collapse
1987

CTV Building

EXPERT PANEL REPORT

Structural Performance of Christchurch CBD Buildings in the 22 February 2011 Aftershock

Covering:
Canterbury Television Building
Pyne Gould Corporation Building
Hotel Grand Chancellor Building
Forsyth Barr Building

February 2012

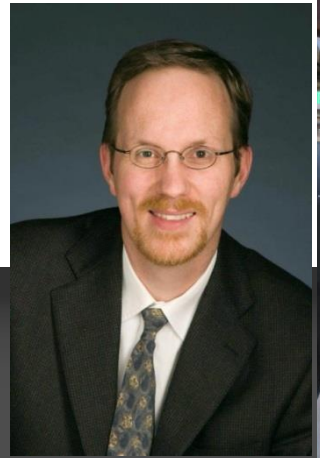
Report of an Expert Panel
appointed by the New Zealand Department of Building and Housing

http://canterbury.royalcommission.govt.nz/

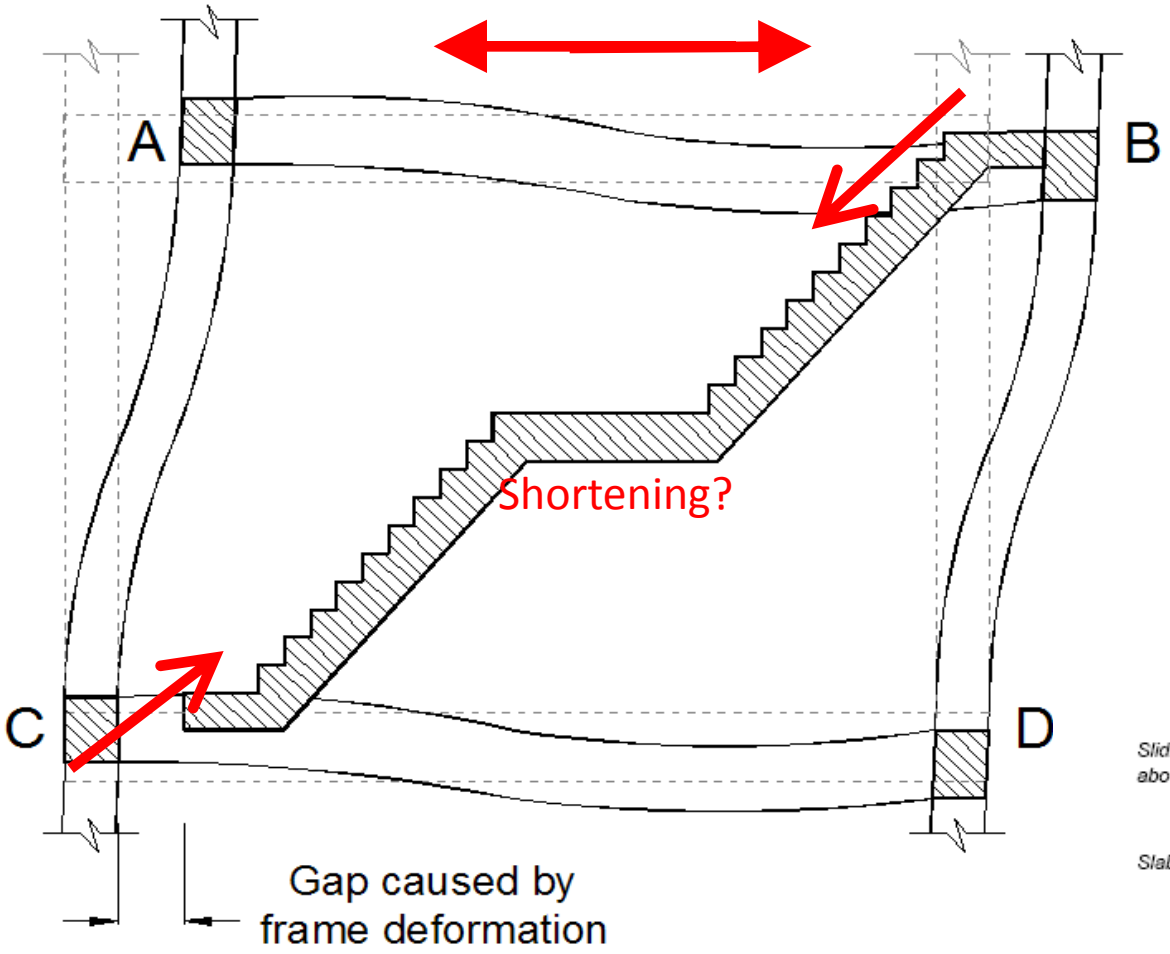
Research

- Better research collaboration Auckland – Canterbury
- Appointment of MBIE Chair in Earthquake Engineering
- Government investment:
  - MBIE direct – QuakeCentre, International Collaboration – RC Walls, Geotechnical
  - Natural Hazards Research Platform
  - Science Challenge 10 – Resilience to Nature's Challenges
  - QuakeCore??

Prof. Ken Elwood



Precast Concrete Stairs



Department of Building and Housing
Te Tari Kaupapa Whare

Practice Advisory 13

Egress Stairs:
Earthquake checks needed for some

This Practice Advisory is issued in response to concerns about stair collapses in Christchurch CBD in the 22 February 2011 Aftershock

Background

The Lyttelton earthquake (aftershock) of 22 February 2011 caused a number of stair failures in buildings in the Christchurch CBD. Although it is recognised that this earthquake made extraordinary demands on existing designs, the failure of stairs is of serious concern. The Department considers it imperative that the circumstances of these failures are fully understood and the implications for similar buildings around New Zealand examined and acted upon.

The report commissioned by the Department on the collapse stairs in the Forsyth Barr Building [1] illustrates an example of the issues and concerns. A report prepared for the Royal Commission [2] provides further comment on the issues and some considerations that may assist structural engineers to decide on retrofit actions. Design considerations for stairs are offered in the SESOC draft Practice Note [3].

Purpose and Scope of Advisory

This Practice Advisory is to:

- alert practising structural engineers assessing existing multi-storey buildings throughout New Zealand to issues relating to safety of stairs

It applies to all existing multi-storey buildings throughout New Zealand:

- to which members of the public have access, including office buildings, particularly those with scissor stair configuration, and
- have stairs designed to slide under seismic action, particularly those with the gap-and-ledge stair detail.

Better detail (Beca 2011):

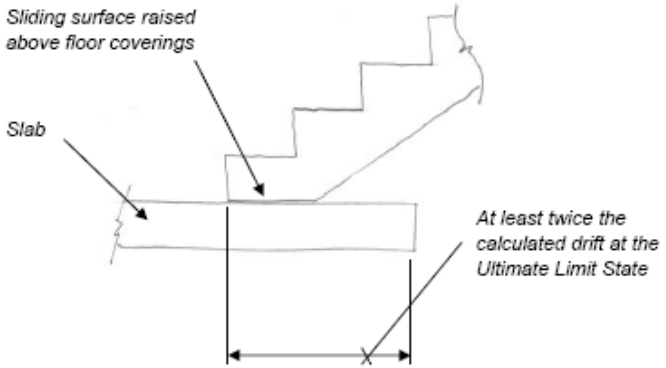
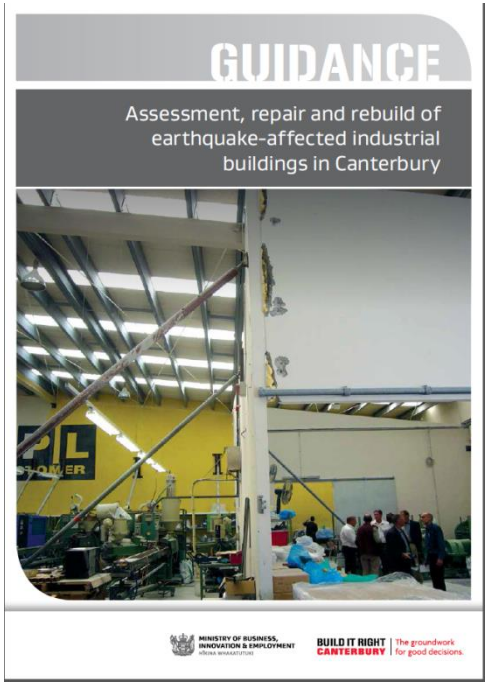


Figure 10.1 : Proposed Superior Base Stair Detail

Actions

- Guidance
  - Industrial Buildings
  - Seismicity
  - Detailed Damage Evaluation of Buildings
  - General practice, low damage, non-structural

- Review of Standards and Code



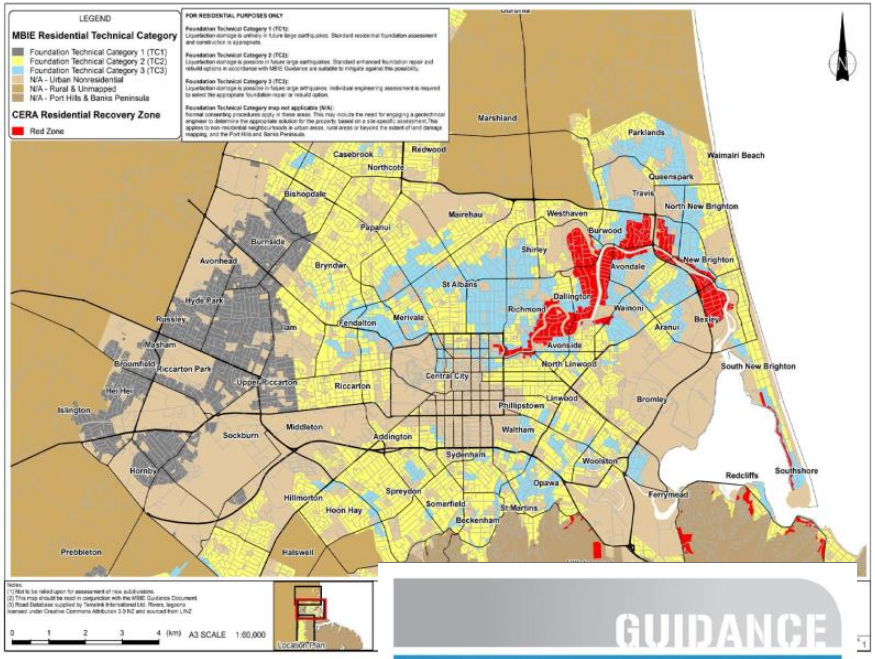
30,000 tonnes ejecta removed September

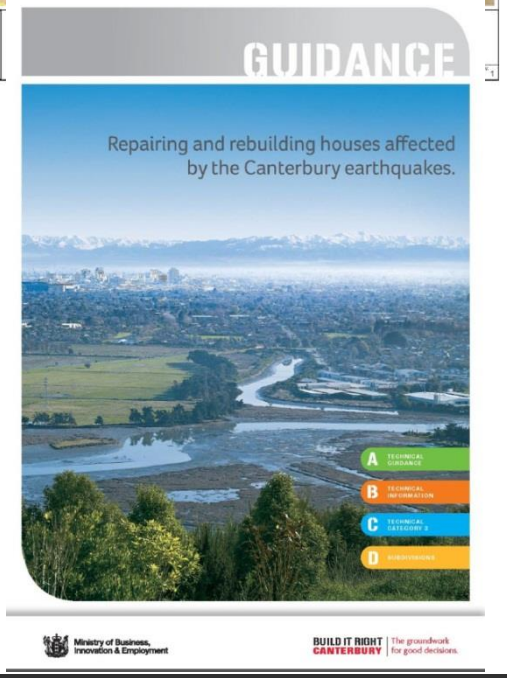
300,000 tonnes removed February

Liquefaction

Retreat and Guidance

- Retreat - Red Zone offers to purchase worst affected residential properties
  - 7000 on flat (multi hazard),
  - 700 in Port Hills (life safety)
- Produce Guidance to repair/rebuild appropriate to ground conditions
  - All parties have common understanding
    - Homeowners
    - Insurers
    - Designers
    - Regulators
- Build Back Smarter



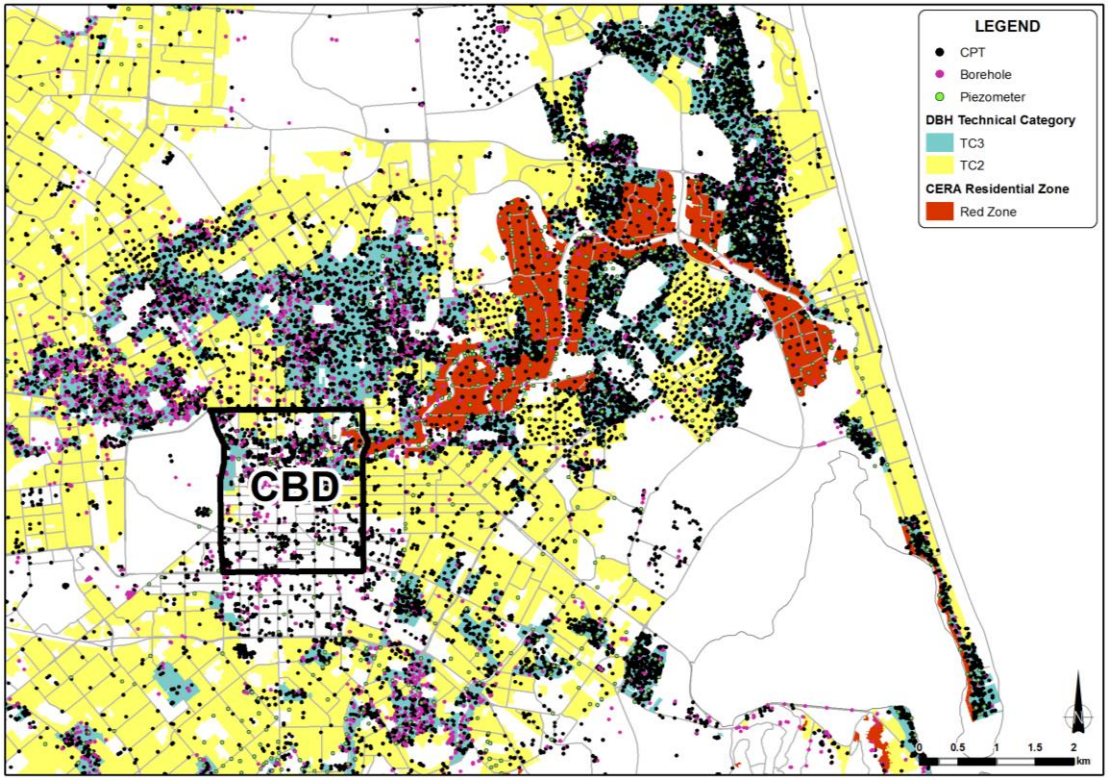


http://www.dbh.govt.nz/

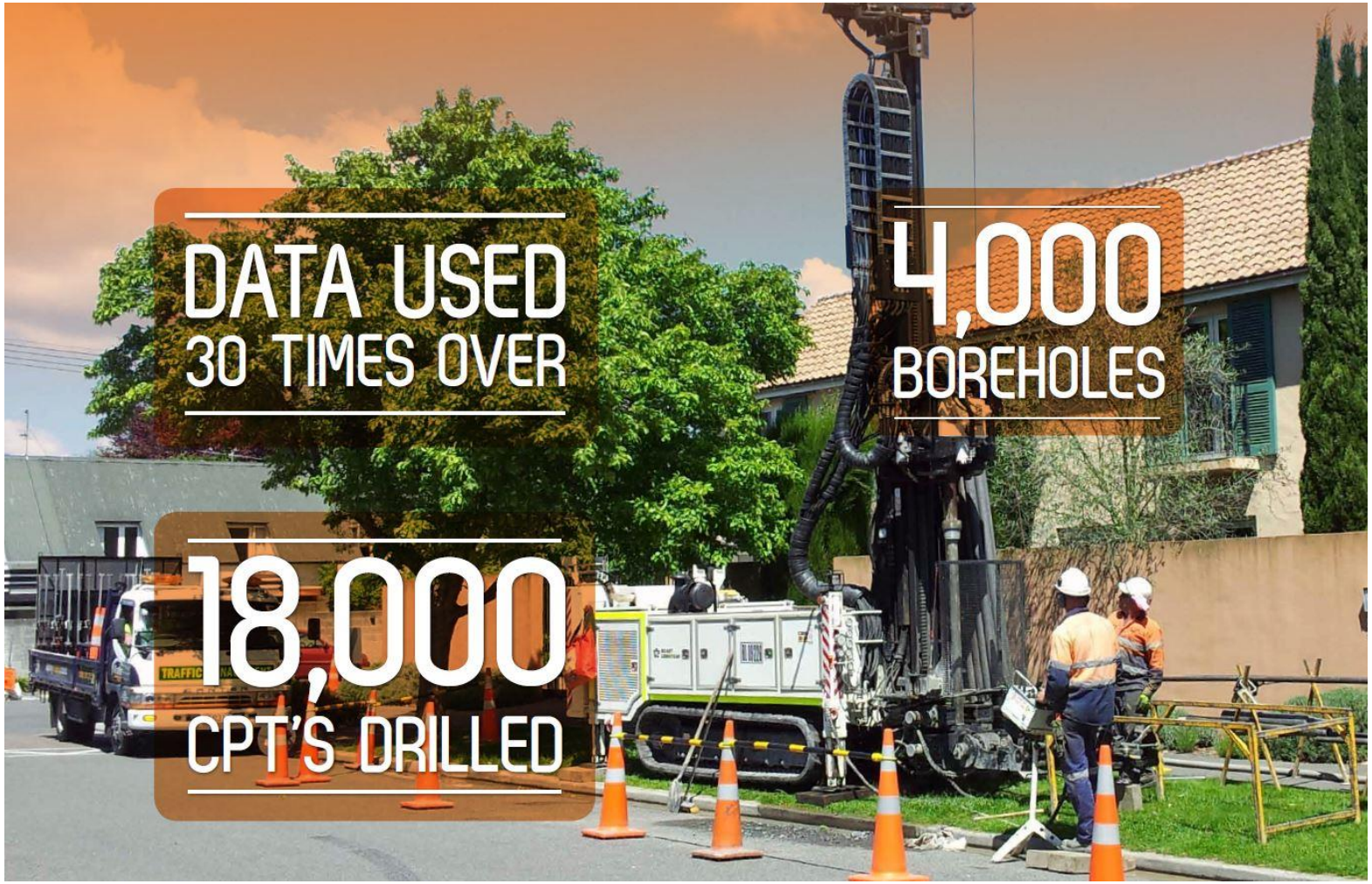
1. Understand hazards & vulnerabilities

- Research
  - Ground shaking, liquefaction, ground stability, flooding

- Use Technology and capture data
  - Existing buildings
    - earthquake-prone
  - Subsurface investigations
    - geotechnical database

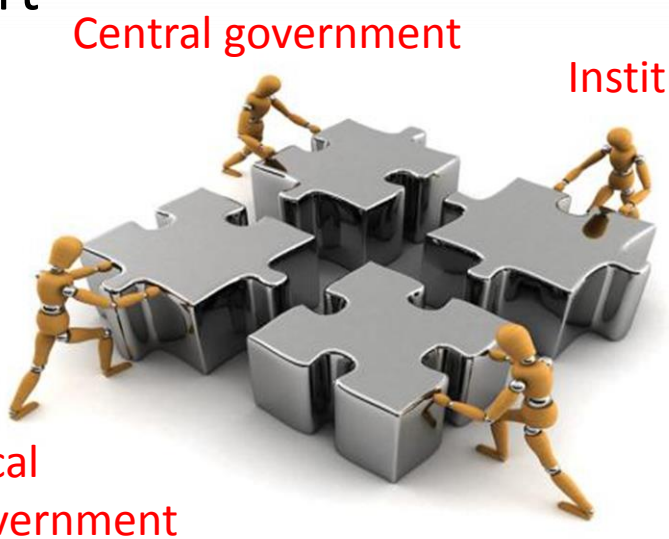


Canterbury Geotechnical Database



2. Build Collaborative Relationships

- Interdisciplinary collaboration to recognise and mitigate hazards
  - Occurs naturally during disasters
  - Mechanisms to encourage in peacetime
- Helps with political process - support
- Cooperation/expertise needed in crisis – trust
- Example MBIE's technical guidance



3. Integrate planning and building

- Better linkage between building & planning regulation
- Build appropriate to the conditions
- Exclusions? – so don't build "red zones" of the future

4. Build for resilience

- Effective Building Controls System
  - Design, design review, construction, construction monitoring
- Designed and detailed for the “what ifs”
  - May be damaged but won’t collapse
    - Ductile not brittle

Ductile walls recommendation

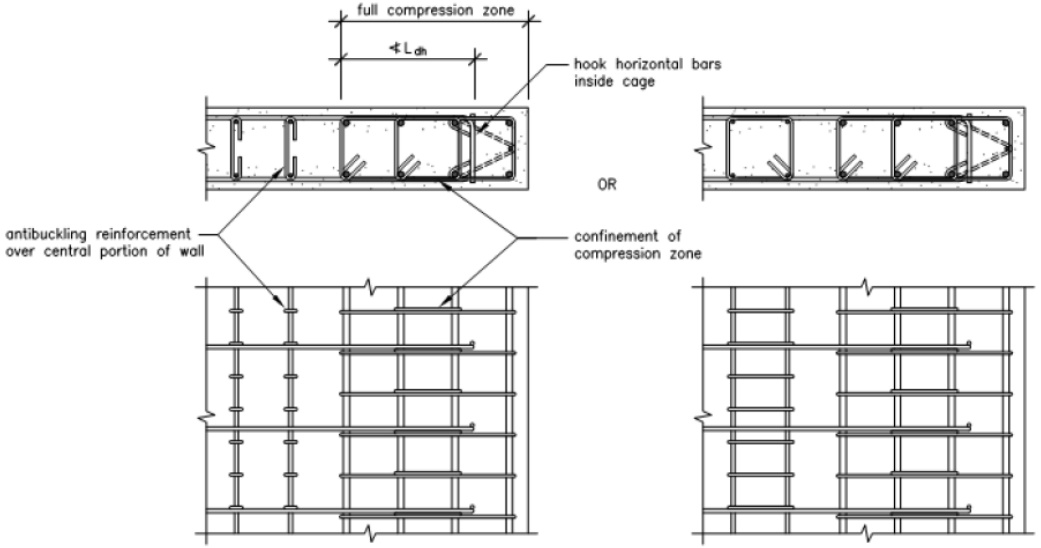


Figure 5: Confinement requirements for doubly reinforced walls

Summary of Lessons

Upfront investment pays for itself many times over.

1. Understand the hazards & vulnerabilities
2. Build collaborative relationships
3. Better integration of building and planning regulation
4. Build for resilience

We’re still learning - from Canterbury and from international experience

“You can never prevent earthquakes, so we have to look at human actions and what we can do to minimise the consequences”

“When we look at how catastrophes happen, it’s because of collapse of an urban system. It’s not so much a million people dying; it’s a million people going, ‘I can’t live here anymore’.”

(L–R) Thermakraft's David Williams, Antoni Rajwer and Huburt Schulte – on the brink of an exciting period and ready for increased demand

Thermakraft's own fire-retardant white-faced foil has been used in the roof of the new building – its reflectance reduces the requirement for lighting

Thermakraft's Herculean comeback

A disastrous fire can often spell the end for a business – but one Kiwi firm has risen from the ashes, taking the opportunity to introduce state-of-the art production lines and rebuild its manufacturing capability.

Thermakraft Industries (NZ) is best known for manufacturing quality membrane products to the building and construction industries. The business, now in its 30th year, has a classic Kiwi 'number 8 wire' story, with founding members making Kraft-based bituminous underlay by night and selling it from the back of their car by day.

Fast-forward to today and Thermakraft is the leading supplier

Raising the tilt slab walls

New Zealand Construction News Feb-Mar 2015

“You never let a serious crisis go to waste … it’s an opportunity to do things you think you could not do before”