



Department of
Building and Housing
Te Tari Kaupapa Whare

Department of Building and Housing Engineering Advisory Group

Overview of TC3 Foundation Guidance Document

Update Briefing for BCAs

20 March 2012



Scope of Briefing

- **Deep geotechnical investigations**
- **Vertical settlement and lateral spreading categories within TC3**
- **New/ rebuilt foundations**
- **Repairing existing foundations**
- **Timeline and communications**



Deep Geotechnical Investigations

- **Required to provide understanding of ground profile (highly variable) to inform foundation repair and rebuild selections and specific engineering designs**
- **An area-wide co-ordinated investigation programme will provide common base of information**
 - 40m - 50m investigation grid (6 to 8 Ha) to build upon existing 200m grid



Deep Geotechnical Investigations (2)

- **If we have this information, then many of the repair and rebuild options won't require site-by-site deep investigations**
 - Particularly important in being able to separate foundation repairs from rebuids
 - And indicating where full rebuilds can be in light construction with simple foundations (surface structures)
- **Needs agreement of all parties and an appropriate co-ordinating leadership group**



Sub-Categorising TC3

(1) Lateral Spreading (ULS)

TC2	TC3	
Minor	Minor to Moderate	Major
<100mm	<200mm	200 to 500mm

- Can generally assume building is in ‘minor to moderate’ category if more than 100m away from a watercourse or other form of free edge that has or could spread



Sub-Categorising TC3 (2) Vertical Settlement (SLS)

TC2	TC3	
Minor	Minor to Moderate	Potentially Significant
<50mm	<100mm	>100mm

- **Requires information from deep geotechnical investigations**



**Vertical
Settlement
(SLS)**

**Potentially
Significant**

100mm

**Minor to
Moderate**

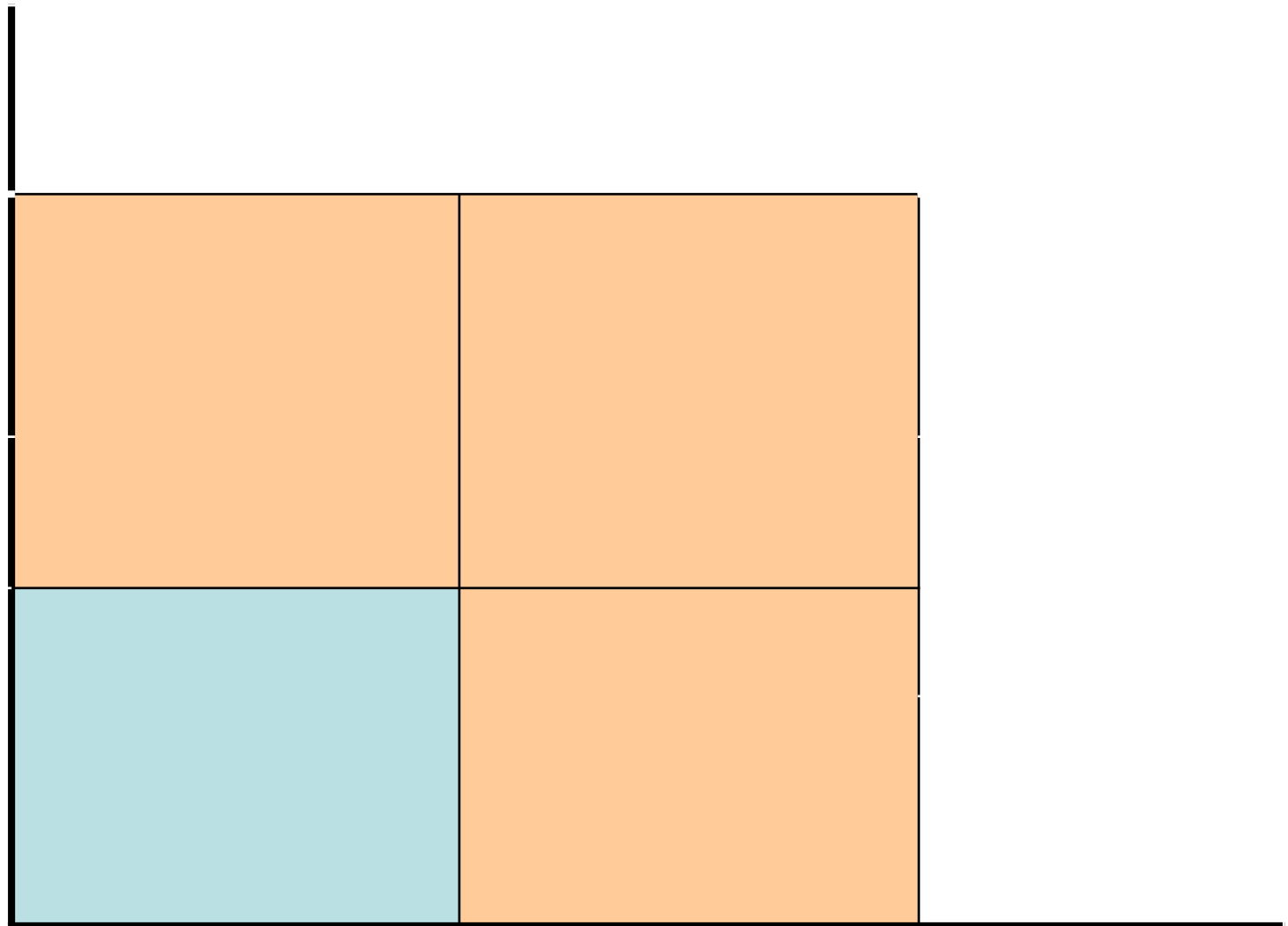
**Minor to
Moderate**

200mm

Major

500mm

**Lateral
Spreading
(ULS)**





TC3 Foundation Rebuilds (est 20-25%) Overview of Options

Type	Objectives	Constraints
Deep piles	Negligible settlement in both small and larger earthquakes	No height and/ or material constraints likely
Site Ground Improvement	Improving the ground to receive a TC2 foundation	Limits on some two storey/ heavy wall types and plan configurations
Surface structures/ shallow foundations	Readily repairable damage in future smaller events	Only suitable for light construction, regular in plan



Site Ground Improvement Options

- **Densified crust**
 - Refilling and compacted
 - Dynamic compaction
- **Cement stabilised crust**
 - Excavate and replace, or in place
- **Deep soil mix columns**
 - also LMG columns, stone columns etc



Two Types of Surface Structures

(1) Enhanced NZS3604 foundations

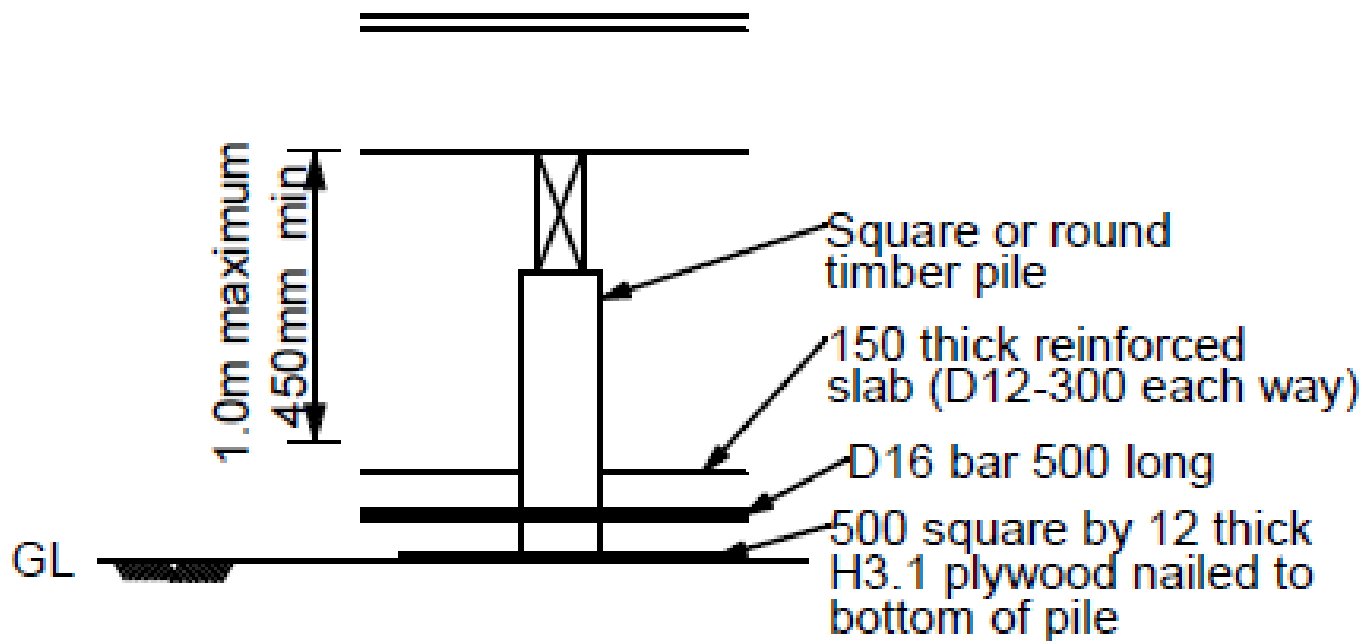
- Suitable as Acceptable Solution for areas of TC3 where potential for moderate vertical settlement and lateral spreading

(2) New surface structure concepts with lateral stretch capacity

- Now considered only likely to be applicable for major lateral spread areas



Concrete Underslab





TC3 Foundation Repairs

(est 50-55% of total)

- **Objective: enabling repairs where possible**
 - Especially timber floor dwellings (Types A & B, which represent ~65% of TC3 dwellings)
- **Rational approach, also based on accepting minor damage in some cases from future moderate events such as 13 June and 23 Dec**



Repair Considerations

- **Proposed repair limits for timber floor houses** (est. up to 60% of houses in TC3)
 - Replacement of up to half of piles, and quarter of perimeter foundation beam permitted
- **Trade-off: replacement of some heavy tile rooves and brick veneers**
 - To improve confidence of adequate performance in future events (code compliance)
 - Depending on level of damage and assessment of future SLS settlement performance



‘Readily Repairable’

- **Accepting future minor damage in moderate earthquakes is the key to the viability of both new surface structures and maximising repairs**
- **Consentable, but goes beyond normal code interpretations**



Key Extracts from Table 8.1 of DBH November 2011 Guidelines

Key Terms	Interpretation
Continue to function	Occupiable as a dwelling
Minor damage to structure	Timber: able to be re-levelled using standard procedures Walls – interior: minor cracking at lining joints
Some damage to building fabric and lining	Some cracking of lining junctions above doorways and windows
Readily repairable	Repairable without relocation of occupants for more than four weeks



Consenting

- **Focusing on achieving Building Consents through standard mechanisms**
- **Guidance will provide reasonable grounds for consent approvals**
- **Councils likely to require peer review of designs for at least the initial stages**



Flood Risk Aspects

- **CERA & CCC working group developing guidelines around floor levels and flood risk**
 - Identifying where other policy inputs required
 - Leading to update of CCC GD13
 - Seeking solutions that avoid the imposition of s73 notices on properties



Briefing Status and Timeline

- **Briefings of PMOs and their engineers and Councils during February**
- **Insurers and EQC briefed via fortnightly Regulatory & Consenting Group meetings**
- **Canterbury Geotech engineers have received proposed geotech investigation criteria and repair approaches**
- **QE2 Park trial full report to be issued - 23 March**
- **Draft of TC3 Guidance Document to Minister – 30 March**
- **TC3 Guidance Document – target publication date end of April**



Summary and Key Actions

- **Technical viability of new foundation types established, and repair options close to resolution**
- **But there are issues associated with the acceptability of future minor damage in moderate events that affect overall viability**
- **Complex communications and public messaging involved if to be successful**
- **Seeking to examine a range of scenarios with insurers (including interaction with flood level requirements)**

Understanding future land performance

Understanding how standard house types will perform

Land

Acceptability to Insurers

Insurance

House Types

The Building Code

Interpreting building regulations in a post-disaster environment

Ensuring the best use of scarce technical resources during the recovery

