Little Akaloa Toilets

Quantitative Engineering Evaluation

Functional Location ID: PRK 3754 BLDG 001

Address: 1315 Chorlton Rd, Little Akaloa

Reference: 237794

Prepared for:

Christchurch City Council

Revision: 2

Date: 23 September 2013

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Executive Summary

This is a summary of the Quantitative Engineering Evaluation for the Little Akaloa Toilets building and is based on the Detailed Engineering Evaluation Procedure document issued by the Engineering Advisory Group on 19 July 2011, visual inspections, available structural documentation and summary calculations as appropriate.

Building Details	**Name**	Little Akaloa Toilets			
Building Location ID	PRK 3754 BLDG 001			**Multiple Building Site**	Y
Building Address	1315 Chorlton Rd, Little Akaloa			**No. of residential units**	N/A
Soil Technical Category	N/A	**Importance Level**	2	**Approximate Year Built**	1950's
Foot Print (m²)	20	**Storeys above ground**	1	**Storeys below ground**	0
Type of Construction	Reinforced concrete roof, unreinforced concrete masonry walls, slab on grade foundations.				
Quantitative L5 Report Results Summary					
Building Occupied	Y	The Little Akaloa Toilets are currently in use.			
Suitable for Continued Occupancy	Y	The Little Akaloa Toilets are suitable for continued occupation.			
Key Damage Summary	Y	Refer to summary of building damage Section 3.1 report body.			
Critical Structural Weaknesses (CSW)	N	No critical structural weaknesses were identified.			
Levels Survey Results	N	Floor levels not measured as minimal signs of settlement and damage to the slab. Slab was also likely to have been constructed with slopes for drainage.			
Building %NBS From IEP	35%	Based on an analysis of capacity and demand.			
Approval					
Author Signature		**Approver Signature**			
Name	Callum Lillywhite	**Name**	David Elliott		
Title	Structural Engineer	**Title**	Senior Structural Engineer		

1 Introduction

1.1 General

On 27 August 2013 Aurecon engineers visited the Little Akaloa Toilets to carry out a building damage and quantitative seismic capacity assessment on behalf of Christchurch City Council. Detailed visual inspections were carried out to assess the damage caused by the earthquakes on 4 September 2010, 22 February 2011, 13 June 2011, 23 December 2011 and related aftershocks.

The scope of work included:

- Assessment of the nature and extent of the building damage.
- Visual assessment of the building strength particularly with respect to safety of occupants if the building is currently occupied.
- Assessment of requirements for detailed engineering evaluation including geotechnical investigation, level survey and any areas where linings and floor coverings need removal to expose structural damage.

This report outlines the results of our quantitative assessment of damage to the Little Akaloa Toilets and is based on the Detailed Engineering Evaluation Procedure document issued by the Structural Advisory Group on 19 July 2011, visual inspections, available structural documentation and calculations as appropriate.

2 Description of the Building

2.1 Building Age and Configuration

The Little Akaloa Toilets is a rectangular shaped building. From discussions with the Christchurch City Council it is likely to have been constructed around the 1950's. It is a single storey building approximately 2.4m high with a footprint of approximately 20m^2. It has a 80mm thick reinforced concrete roof and a concrete slab on grade foundation. All walls are unreinforced 20 series concrete blockwork walls. It is assumed that the slab-on-grade foundation would consist of edge thickenings however no drawings were available to verify this.

The building has been considered as an importance level 2 structure in accordance with NZS 1170 Part 0:2002.

2.2 Building Structural Systems Vertical and Horizontal

The reinforced concrete roof is supported on the 20 series unreinforced concrete blockwork walls. The walls are supported on the slab-on-grade foundation.

Horizontal loads generated at roof level are resisted by the 20 series unreinforced concrete blockwork walls in both directions. These walls transfer the loads in-plane to the slab-on-grade foundation.

2.3 Reference Building Type

A general overview of the reference building type, construction era and likely earthquake risk is presented in the figure below. The Little Akaloa Toilets are assumed to have been constructed in the 1950's and although this does not quite align with the figure below and as it is of unreinforced masonry construction, the building would be classed as Probably Earthquake Prone.

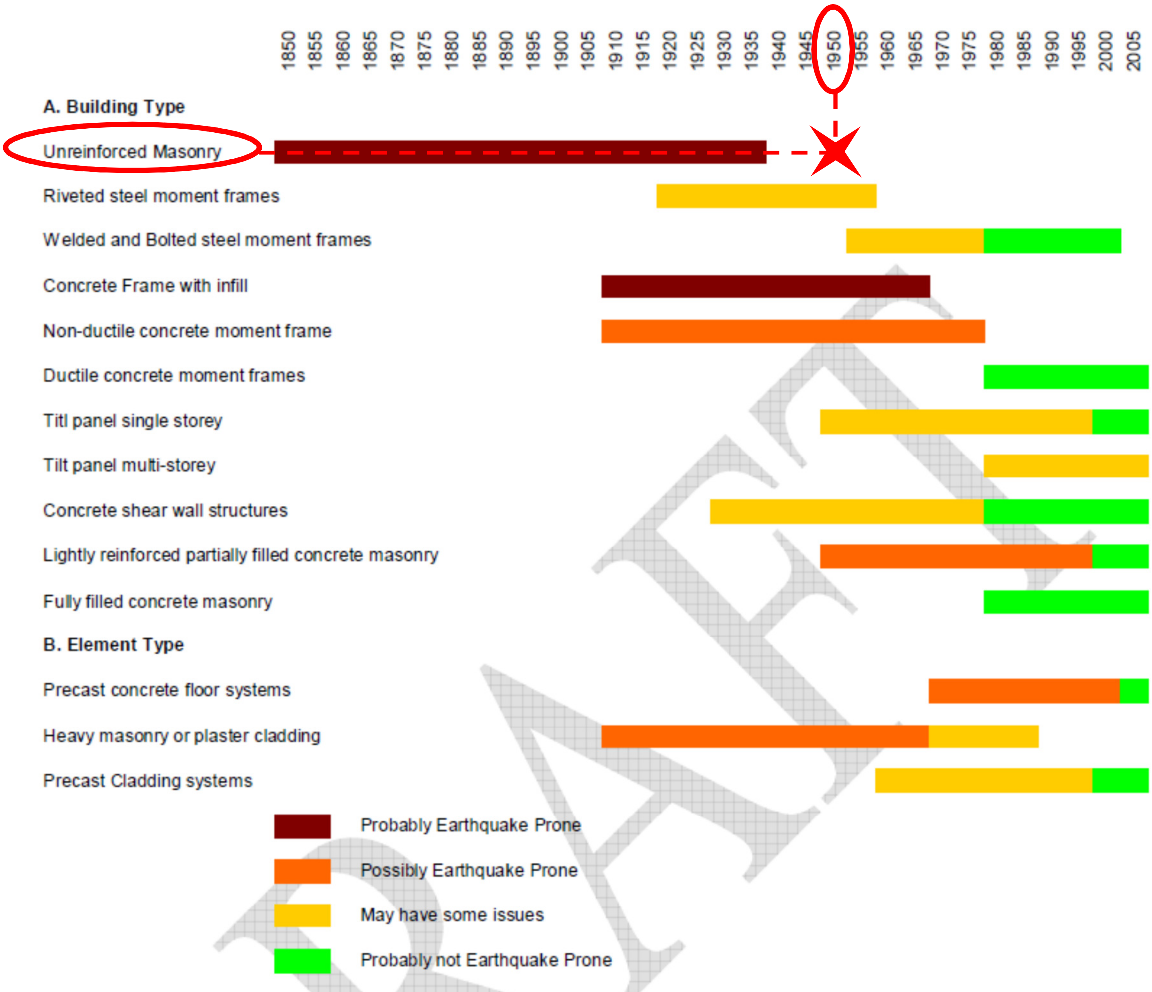


Figure 1: Timeline showing the building types, approximate time of construction and likely earthquake risk. (From the Draft Guidance on DEEs of non-residential buildings by the Engineering Advisory Group)

2.4 Building Foundation System and Soil Conditions

There is a slab-on-grade foundation and it is likely to have edge thickenings however no drawings were available to verify this.

The land and surrounds of Little Akaloa Toilets are zoned N/A which means that no mapping of the land with respect to technical categories has been carried out. There was no local evidence of settlement or liquefaction related damage to the surrounding land at the time of the inspection.

2.5 Available Structural Documentation and Inspection Priorities

No structural or architectural drawings were available for the Little Akaloa Toilets. Inspection priorities related to a review of potential damage to concrete roof, masonry walls and foundations. A measure up of the building was carried out on site and a sketched plan and elevations can be seen in Appendix B.

2.6 Available Survey Information

A floor level survey was not undertaken at the time of the inspection due to the small size in floor area and as the building is a toilet block, falls have likely been built into the slab. The lack of damage noted in Section 3 of this report is also an indication that minimal settlement has occurred within the toilet block.

3 Structural Investigation

3.1 Summary of Building Damage

The Little Akaloa Toilets was currently open at the time the damage assessment was carried out.

The following damage was noticed and reviewed during the inspections of the building;

- Minor step cracking in the blockwork wall mortar joints at the northern end of the buiding; and
- Minor cracking in the floor slab. Most of these appear to be shrinkage cracking that would have been pre-existing.

3.2 Record of Intrusive Investigation

Due to the generic nature of the Little Akaloa Toilets, a significant amount of structural information can be inferred from the building form and construction materials. As no significant damage was noted, an intrusive investigation was neither warranted nor undertaken.

3.3 Damage Discussion

There was minimal damage to the Little Akaloa Toilets as a result of seismic actions as detailed above in Section 3.1.

4 Building Review Summary

4.1 Building Review Statement

As noted above intrusive investigations were not carried out for the Little Akaloa Toilets. Due to the generic nature of the building a significant amount of information can be inferred from an external and internal inspection.

4.2 Critical Structural Weaknesses

No specific critical structural weaknesses were identified as part of the building quantitative assessment. It is of note that all the walls in the building are unreinforced masonry and are therefore likely to have a brittle failure mechanism.

5 Building Strength (Refer to Appendix D for background information)

5.1 General

The building has performed well during the Canterbury earthquakes evident by the low level of damage noted in Section 3.1 of this report.

5.2 Initial %NBS Assessment

The seismic design parameters used to complete this strength assessment are based on current design requirements from NZS1170:2002 and the NZBC clause B1. For this building, the parameters are:

Table 1: Parameters used in the Seismic Assessment

Seismic Parameter	Quantity	Comment/Reference
Site Soil Class	D	NZS 1170.5:2004, Clause 3.1.3, Deep or Soft Soil
Site Hazard Factor, Z	0.30	DBH Info Sheet on Seismicity Changes (Effective 19 May 2011)
Return period Factor, R_u	1.0	NZS 1170.5:2004, Table 3.5 (Importance Level 2)
Ductility factor in both directions, μ	1.0	Unreinforced concrete masonry

Despite the use of best national and international practice in this analysis and assessment, the values are uncertain due to the many assumptions and simplifications which were made during the assessment (Refer to Appendix C for the limitation and assumptions).

A structural performance summary of the building is shown in the Table 2 below. Note that the values given represent the critical elements in the building. When redistributed, the values can be relied on as these effectively define the building's capacity.

Table 2: Summary of Performance

Structural Element/System	Comments	%NBS Based of Detailed Assessment
Little Akaloa Toilets		**35%**
Longitudinal direction (N-S direction) (Along)		
In plane strength	Governed by rocking capacity of the walls adjacent to the openings.	35%
Out of plane strength		100%
Transverse direction (E-W direction) (Across)		
In plane strength	Governed by rocking capacity of the walls	42%
Out of plane strength		100%

5.3 Results Discussion

In summary, detailed calculations give a percentage new building standard (%NBS) longitudinally of 35% limited by the rocking capacity of the walls adjacent to the window openings. Transversally the building achieves 42% NBS limited by the rocking capacity of the walls in this direction. Rocking is the governing mode in both direction due to their being a number of shorter length walls.

The reinforced concrete roof will adequately transfer the loads between the walls in each direction due to close spacing of all walls.

The concrete blockwork walls achieve 100% NBS in out-of-plane loading as they are only 2.2m high and are restrained by the floor slab and concrete roof.

6 Conclusions and Recommendations

The land and surrounds of Little Akaloa Toilets are zoned as zoned N/A which means that no mapping of the land with respect to technical categories has been carried out. There was no local evidence of settlement or liquefaction related damage to the surrounding land at the time of the inspection. Given the good performance of the Little Akaloa Toilets in the Canterbury earthquake sequence and the lack of foundation damage, **a geotechnical investigation is currently not considered necessary**.

The building is currently in use and in our opinion the Little Akaloa Toilets **is suitable for continued occupation**.

Cracking to the blockwork wall mortar joints should be raked out and repointed.

We recommend that the building be strengthened to a minimum of 67%NBS and preferably 100%NBS where practical. One way to do this could be by removing the concrete roof and installing a light-weight roof constructed from timber or steel with a plasterboard or plywood ceiling.

7 Explanatory Statement

The inspections of the building discussed in this report have been undertaken to assess structural earthquake damage. No analysis has been undertaken to assess the strength of the building or to determine whether or not it complies with the relevant building codes, except to the extent that Aurecon expressly indicates otherwise in the report. Aurecon has not made any assessment of structural stability or building safety in connection with future aftershocks or earthquakes – which have the potential to damage the building and to jeopardise the safety of those either inside or adjacent to the building, except to the extent that Aurecon expressly indicates otherwise in the report.

This report is necessarily limited by the restricted ability to carry out inspections due to potential structural instabilities/safety considerations, and the time available to carry out such inspections. The report does not address defects that are not reasonably discoverable on visual inspection, including defects in inaccessible places and latent defects. Where site inspections were made, they were restricted to external inspections and, where practicable, limited internal visual inspections.

To carry out the structural review, existing building drawings were obtained from the Christchurch City Council records. We have assumed that the building has been constructed in accordance with the drawings.

While this report may assist the client in assessing whether the building should be repaired, strengthened or demolished that decision is the sole responsibility of the client.

This review has been prepared by Aurecon at the request of its client and is exclusively for the client's use. It is not possible to make a proper assessment of this review without a clear understanding of the terms of engagement under which it has been prepared, including the scope of the instructions and directions given to and the assumptions made by Aurecon. The report will not address issues which would need to be considered for another party if that party's particular circumstances, requirements and experience were known and, further, may make assumptions about matters of which a third party is not aware. No responsibility or liability to any third party is accepted for any loss or damage whatsoever arising out of the use of or reliance on this report by any third party.

Without limiting any of the above, Aurecon's liability, whether under the law of contract, tort, statute, equity or otherwise, is limited as set out in the terms of the engagement with the client.

Appendices

Appendix A
Site Map and Photos

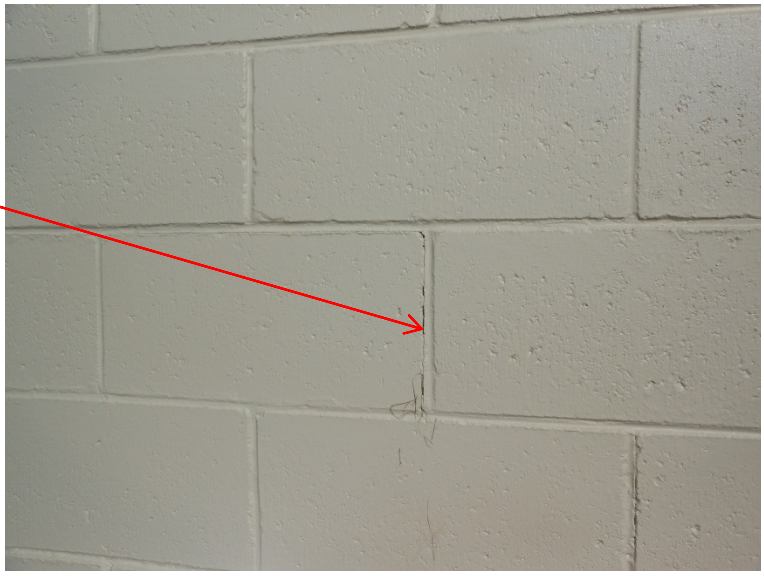
27 August 2013 – Little Akaloa Toilets Site Photographs

Location of the Little Akaloa Toilets:

Location picture above provided by Christchurch City Council.

Building Northern elevation.	

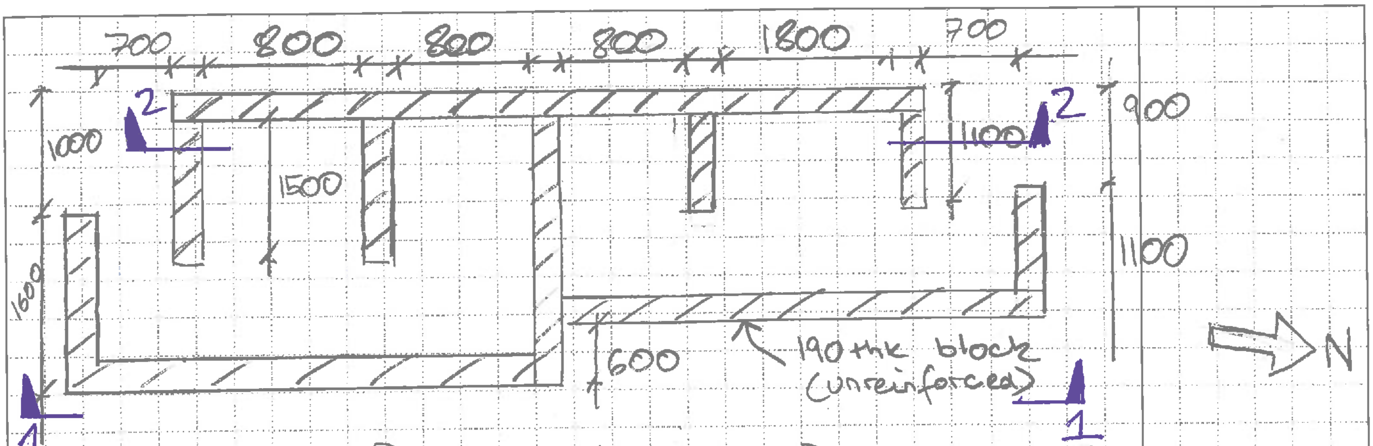
Building rear elevation.	
View on top of concrete roof showing water tank from southern side of building.	
General view from inside the building.	

Minor step cracking in the blockwork wall mortar joints in the northern corner of the building.	
Minor cracking in the slab-on-grade foundation. This appears to be pre-existing.	
Minor cracking in the slab-on-grade foundation. This appears to be pre-existing.	

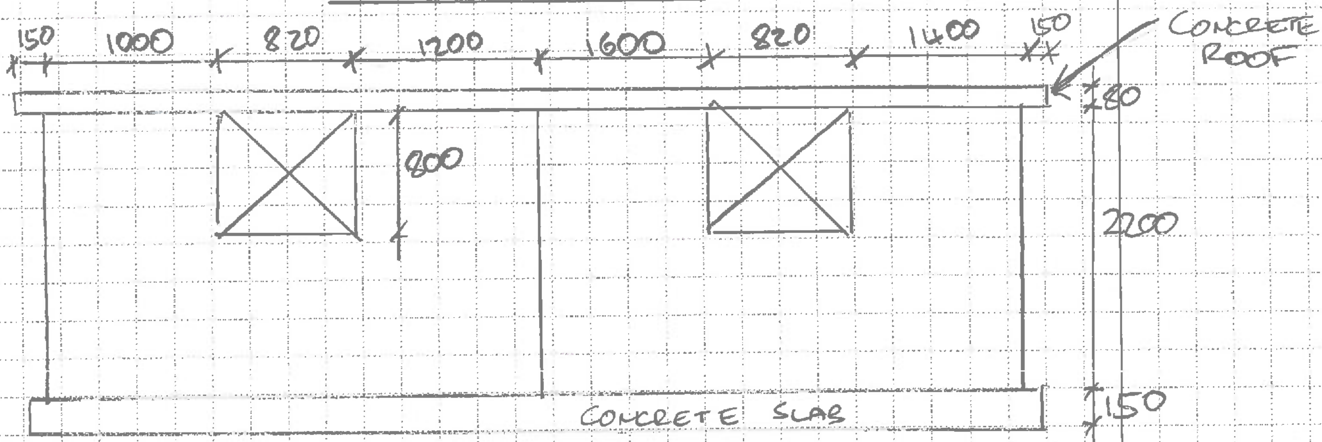
Appendix B
Structural Sketches

aurecon

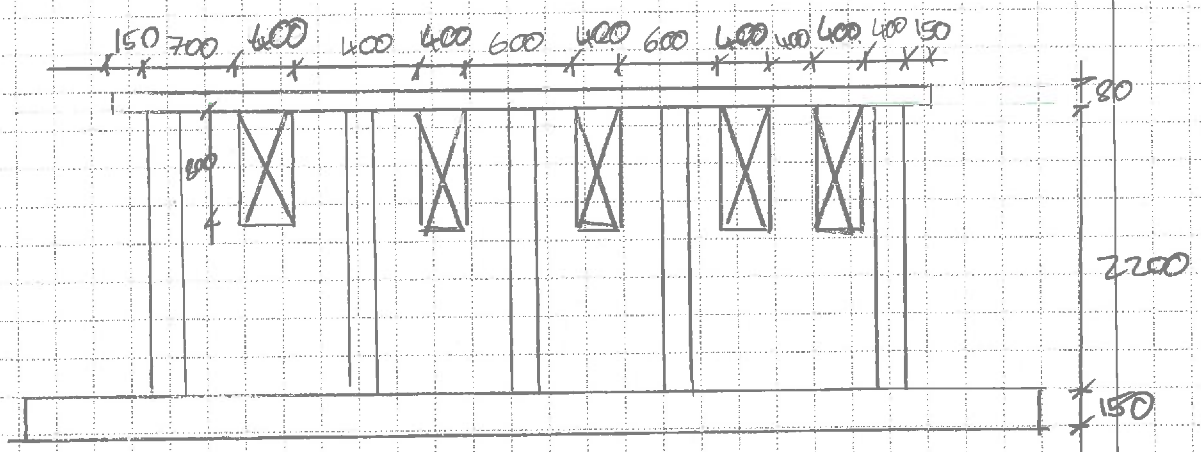
Client: CCC			Date: 27/08/13
Project/Job: LITTLE AKALOA TOILETS		Job No: 237794	
Subject: FLOOR PLAN AND ELEVATIONS.		Sheet No: SK01	By: CTL



PLAN VIEW (NTS)



SECTION 1-1 (NTS)



SECTION 2-2. (NTS)

Appendix C
References, Limitations and Assumptions

References

1. Faculty of Engineering, The University of Auckland “Assessment and Improvement of Unreinforced Masonry Buildings for Earthquake Resistance”, February 2011

2. Ministry of Business, Innovation and Employment (MBIE) “Repairing and rebuilding houses affected by the Canterbury earthquakes”, December 2012

3. New Zealand Society for Earthquake Engineering (NZSEE), “Assessment and Improvement of the Structural Performance of Buildings in Earthquakes”, April 2012

4. Standards New Zealand, “AS/NZS 1170 Part 0, Structural Design Actions: General Principles”, 2002

5. Standards New Zealand, “AS/NZS 1170 Part 1, Structural Design Actions: Permanent, imposed and other actions”, 2002

6. Standards New Zealand, “NZS 1170 Part 5, Structural Design Actions: Earthquake Actions – New Zealand”, 2004

7. Standards New Zealand, “NZS 3101 Part 1, The Design of Concrete Structures”, 2006

8. Standards New Zealand, “NZS 4229, Concrete Masonry Buildings Not Requiring Specific Engineering Design”, 1999

9. Standards New Zealand, “NZS 4230, Design of Reinforced Concrete Masonry Structures”, 2004

Limitations and Assumptions

The following table presents the limitations and assumptions made in order to carry out a detailed seismic assessment.

Table 3: Assumptions made

Assumptions	Description of the assumptions	Values
W_t Unreinforced 20 series concrete blockwork	From AS1170.1 Table A2	2.1kN/m^2
W_t Concrete		24 kN/m^3
Reinforcing bar yield strength, f_y		250 MPa
Unreinforced concrete blockwork strength, f'_b	From Reference 1, Soft Brick.	14.4 MPa
Mortar compressive strength, f'_j	From Reference 1, Medium Mortar.	5.5 MPa
Ductility for the unreinforced concrete blockwork in both directions (μ)	Unreinforced blockwork walls have limited ductility.	1.0

Appendix D
Strength Assessment Explanation

New building standard (NBS)

New building standard (NBS) is the term used with reference to the earthquake standard that would apply to a new building of similar type and use if the building was designed to meet the latest design Codes of Practice. If the strength of a building is less than this level, then its strength is expressed as a percentage of NBS.

Earthquake Prone Buildings

A building can be considered to be earthquake prone if its strength is less than one third of the strength to which an equivalent new building would be designed, that is, less than 33%NBS (as defined by the New Zealand Building Act). If the building strength exceeds 33%NBS but is less than 67%NBS the building is considered at risk.

Christchurch City Council Earthquake Prone Building Policy 2010

The Christchurch City Council (CCC) already had in place an Earthquake Prone Building Policy (EPB Policy) requiring all earthquake-prone buildings to be strengthened within a timeframe varying from 15 to 30 years. The level to which the buildings were required to be strengthened was 33%NBS.

As a result of the 4 September 2010 Canterbury earthquake the CCC raised the level that a building was required to be strengthened to from 33% to 67% NBS but qualified this as a target level and noted that the actual strengthening level for each building will be determined in conjunction with the owners on a building-by-building basis. Factors that will be taken into account by the Council in determining the strengthening level include the cost of strengthening, the use to which the building is put, the level of danger posed by the building, and the extent of damage and repair involved.

Irrespective of strengthening level, the threshold level that triggers a requirement to strengthen is 33%NBS.

As part of any building consent application fire and disabled access provisions will need to be assessed.

Christchurch Seismicity

The level of seismicity within the current New Zealand loading code (AS/NZS 1170) is related to the seismic zone factor. The zone factor varies depending on the location of the building within NZ. Prior to the 22nd February 2011 earthquake the zone factor for Christchurch was 0.22. Following the earthquake the seismic zone factor (level of seismicity) in the Christchurch and surrounding areas has been increased to 0.3. This is a 36% increase.

For this assessment, the building's earthquake resistance is compared with the current New Zealand Building Code requirements for a new building constructed on the site. This is expressed as a percentage of new building standard (%NBS). The new building standard load requirements have been determined in accordance with the current earthquake loading standard (NZS 1170.5:2004 Structural design actions - Earthquake actions - New Zealand).

The likely capacity of this building has been derived in accordance with the New Zealand Society for Earthquake Engineering (NZSEE) guidelines 'Assessment and Improvement of the Structural Performance of Buildings in Earthquakes' (AISPBE), 2006. These guidelines provide an Initial Evaluation Procedure that assesses a buildings capacity based on a comparison of loading codes from when the building was designed and currently. It is a quick high-level procedure that can be used when undertaking a Qualitative analysis of a building. The guidelines also provide guidance on calculating a modified Ultimate Limit State capacity of the building which is much more accurate and can be used when undertaking a Quantitative analysis.

The New Zealand Society for Earthquake Engineering has proposed a way for classifying earthquake risk for existing buildings in terms of %NBS and this is shown in Figure C1 below.

Description	Grade	Risk	%NBS	Existing Building Structural Performance	Improvement of Structural Performance: Legal Requirement	Improvement of Structural Performance: NZSEE Recommendation
Low Risk Building	A or B	Low	Above 67	Acceptable (improvement may be desirable)	The Building Act sets no required level of structural improvement (unless change in use) This is for each TA to decide. Improvement is not limited to 34%NBS.	100%NBS desirable. Improvement should achieve at least 67%NBS
Moderate Risk Building	B or C	Moderate	34 to 66	Acceptable legally. Improvement recommended		Not recommended. Acceptable only in exceptional circumstances
High Risk Building	D or E	High	33 or lower	Unacceptable (Improvement	Unacceptable	Unacceptable

Figure C1: NZSEE Risk Classifications Extracted from table 2.2 of the NZSEE 2006 AISPBE Guidelines

Table C1 below compares the percentage NBS to the relative risk of the building failing in a seismic event with a 10% probability of exceedance in 50 years (i.e. 0.2% in the next year). It is noted that the current seismic risk in Christchurch results in a 6% probability of exceedance in the next year.

Table C1: Relative Risk of Building Failure In A

Percentage of New Building Standard (%NBS)	Relative Risk (Approximate)
>100	<1 time
80-100	1-2 times
67-80	2-5 times
33-67	5-10 times
20-33	10-25 times
<20	>25 times

Appendix E
Background and Legal Framework

Background

Aurecon has been engaged by the Christchurch City Council (CCC) to undertake a detailed engineering evaluation of the building

This report is a Quantitative Assessment of the building structure, and is based on the Detailed Engineering Evaluation Procedure document (draft) issued by the Structural Advisory Group on 19 July 2011.

A Quantitative Assessment involves inspections of the building and a desktop review of existing structural and geotechnical information, including existing drawings and calculations, if available and intrusive investigations where necessary. Detailed analysis is then undertaken to determine the current strength of the building in terms of a percentage of current b %NBS

Compliance

This section contains a brief summary of the requirements of the various statutes and authorities that control activities in relation to buildings in Christchurch at present.

Canterbury Earthquake Recovery Authority (CERA)

CERA was established on 28 March 2011 to take control of the recovery of Christchurch using powers established by the Canterbury Earthquake Recovery Act enacted on 18 April 2011. This act gives the Chief Executive Officer of CERA wide powers in relation to building safety, demolition and repair. Two relevant sections are:

Section 38 – Works

This section outlines a process in which the chief executive can give notice that a building is to be demolished and if the owner does not carry out the demolition, the chief executive can commission the demolition and recover the costs from the owner or by placing a charge on the owners' land.

Section 51 – Requiring Structural Survey

This section enables the chief executive to require a building owner, insurer or mortgagee carry out a full structural survey before the building is re-occupied.

We understand that CERA will require a detailed engineering evaluation to be carried out for all buildings (other than those exempt from the Earthquake Prone Building definition in the Building Act). It is anticipated that CERA will adopt the Detailed Engineering Evaluation Procedure document (draft) issued by the Structural Advisory Group on 19 July 2011. This document sets out a methodology for both qualitative and quantitative assessments.

The qualitative assessment is a desk-top and site inspection assessment. It is based on a thorough visual inspection of the building coupled with a review of available documentation such as drawings and specifications. The quantitative assessment involves analytical calculation of the buildings strength and may require non-destructive or destructive material testing, geotechnical testing and intrusive investigation.

It is anticipated that factors determining the extent of evaluation and strengthening level required will include:

- The importance level and occupancy of the building

- The placard status and amount of damage
- The age and structural type of the building
- Consideration of any critical structural weaknesses
- The extent of any earthquake damage

Building Act

Several sections of the Building Act are relevant when considering structural requirements:

Section 112 – Alterations

This section requires that an existing building complies with the relevant sections of the Building Code to at least the extent that it did prior to any alteration. This effectively means that a building cannot be weakened as a result of an alteration (including partial demolition).

Section 115 – Change of Use

This section requires that the territorial authority (in this case Christchurch City Council (CCC)) be satisfied that the building with a new use complies with the relevant sections of the Building Code 'as near as is reasonably practicable'. Regarding seismic capacity 'as near as reasonably practicable' has previously been interpreted by CCC as achieving a minimum of 67%NBS however where practical achieving 100%NBS is desirable. The New Zealand Society for Earthquake Engineering (NZSEE) recommend a minimum of 67%NBS.

Section 121 – Dangerous Buildings

The definition of dangerous building in the Act was extended by the Canterbury Earthquake (Building Act) Order 2010, and it now defines a building as dangerous if:

- in the ordinary course of events (excluding the occurrence of an earthquake), the building is likely to cause injury or death or damage to other property; or
- in the event of fire, injury or death to any persons in the building or on other property is likely because of fire hazard or the occupancy of the building; or
- there is a risk that the building could collapse or otherwise cause injury or death as a result of earthquake shaking that is less than a 'moderate earthquake' (refer to Section 122 below); or
- there is a risk that that other property could collapse or otherwise cause injury or death; or
- a territorial authority has not been able to undertake an inspection to determine whether the building is dangerous.

Section 122 – Earthquake Prone Buildings

This section defines a building as earthquake prone if its ultimate capacity would be exceeded in a 'moderate earthquake' and it would be likely to collapse causing injury or death, or damage to other property. A moderate earthquake is defined by the building regulations as one that would generate ground shaking 33% of the shaking used to design an equivalent new building.

Section 124 – Powers of Territorial Authorities

This section gives the territorial authority the power to require strengthening work within specified timeframes or to close and prevent occupancy to any building defined as dangerous or earthquake prone.

Section 131 – Earthquake Prone Building Policy

This section requires the territorial authority to adopt a specific policy for earthquake prone, dangerous and insanitary buildings.

Christchurch City Council Policy

Christchurch City Council adopted their Earthquake Prone, Dangerous and Insanitary Building Policy in 2006. This policy was amended immediately following the Darfield Earthquake of the 4th September 2010.

The 2010 amendment includes the following:

- A process for identifying, categorising and prioritising Earthquake Prone Buildings, commencing on 1 July 2012;
- A strengthening target level of 67% of a new building for buildings that are Earthquake Prone;
- A timeframe of 15-30 years for Earthquake Prone Buildings to be strengthened; and,
- Repair works for buildings damaged by earthquakes will be required to comply with the above.

The council has stated their willingness to consider retrofit proposals on a case by case basis, considering the economic impact of such a retrofit.

We anticipate that any building with a capacity of less than 33%NBS (including consideration of critical structural weaknesses) will need to be strengthened to a target of 67%NBS of new building standard as recommended by the Policy.

If strengthening works are undertaken, a building consent will be required. A requirement of the consent will require upgrade of the building to comply 'as near as is reasonably practicable' with:

- The accessibility requirements of the Building Code.
- The fire requirements of the Building Code. This is likely to require a fire report to be submitted with the building consent application.

Building Code

The building code outlines performance standards for buildings and the Building Act requires that all new buildings comply with this code. Compliance Documents published by The Department of Building and Housing can be used to demonstrate compliance with the Building Code.

After the February Earthquake, on 19 May 2011, Compliance Document B1: Structure was amended to include increased seismic design requirements for Canterbury as follows:

- Hazard Factor increased from 0.22 to 0.3 (36% increase in the basic seismic design load)
- Serviceability Return Period Factor increased from 0.25 to 0.33 (80% increase in the serviceability design loads when combined with the Hazard Factor increase)

The increase in the above factors has resulted in a reduction in the level of compliance of an existing building relative to a new building despite the capacity of the existing building not changing.

Appendix F
Standard Reporting Spread Sheet

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Little Akaloa Toilets	Reviewer:	David Elliott
Building Address:	Unit: / No: 1315 / Street: Chorlton Road	CPEng No:	202002
Legal Description:		Company:	Aurecon
		Company project number:	237794
		Company phone number:	03 375 0761
GPS south:	Degrees 43, Min 40, Sec 30.50	Date of submission:	23/09/2013
GPS east:	Degrees 172, Min 59, Sec 32.10	Inspection Date:	27/08/2013
		Revision:	2
Building Unique Identifier (CCC):	PRK 3754 BLDG 001	Is there a full report with this summary?	yes

Site

Site slope:	flat	Max retaining height (m):	0
Soil type:	mixed	Soil Profile (if available):	
Site Class (to NZS1170.5):	D		
Proximity to waterway (m, if <100m):	5	If Ground improvement on site, describe:	
Proximity to clifftop (m, if < 100m):			
Proximity to cliff base (m,if <100m):	5	Approx site elevation (m):	3.00

Building

No. of storeys above ground:	1 (single storey = 1)	Ground floor elevation (Absolute) (m):	5.00
Ground floor split?	no	Ground floor elevation above ground (m):	0.00
Storeys below ground	0		
Foundation type:	strip footings	if Foundation type is other, describe:	
Building height (m):	2.50	height from ground to level of uppermost seismic mass (for IEP only) (m):	
Floor footprint area (approx):	20		
Age of Building (years):	60	Date of design:	1935-1965
Strengthening present?	no	If so, when (year)?	
		And what load level (%g)?	
Use (ground floor):	public	Brief strengthening description:	
Use (upper floors):			
Use notes (if required):			
Importance level (to NZS1170.5):	IL2		

Gravity Structure

Gravity System:	load bearing walls		
Roof:	concrete	slab thickness (mm)	130
Floors:	concrete flat slab	slab thickness (mm)	
Beams:	none	overall depth x width (mm x mm)	
Columns:	load bearing walls	typical dimensions (mm x mm)	
Walls:	partially filled concrete masonry	thickness (mm)	190

Lateral load resisting structure

Note: Define along and across in detailed report!

Lateral system along:	unreinforced masonry bearing wall - brick	note wall thickness and cavity	
Ductility assumed, μ:	1.00		
Period along:	0.40 (0.40 from parameters in sheet)	estimate or calculation?	estimated
Total deflection (ULS) (mm):		estimate or calculation?	
maximum interstorey deflection (ULS) (mm):		estimate or calculation?	
Lateral system across:	unreinforced masonry bearing wall - brick	note wall thickness and cavity	
Ductility assumed, μ:	1.00		
Period across:	0.40 (0.00)	estimate or calculation?	estimated
Total deflection (ULS) (mm):		estimate or calculation?	
maximum interstorey deflection (ULS) (mm):		estimate or calculation?	

Separations:

north (mm):	(leave blank if not relevant)
east (mm):	
south (mm):	
west (mm):	

Non-structural elements

Stairs:	
Wall cladding:	
Roof Cladding:	
Glazing:	
Ceilings:	
Services(list):	

Available documentation

Architectural	none	original designer name/date	
Structural	none	original designer name/date	
Mechanical	none	original designer name/date	
Electrical	none	original designer name/date	
Geotech report	none	original designer name/date	

Damage

Site: (refer DEE Table 4-2)

Site performance:	Good	Describe damage:	
Settlement:	none observed	notes (if applicable):	
Differential settlement:	none observed	notes (if applicable):	
Liquefaction:	none apparent	notes (if applicable):	
Lateral Spread:	none apparent	notes (if applicable):	
Differential lateral spread:	none apparent	notes (if applicable):	
Ground cracks:	none apparent	notes (if applicable):	
Damage to area:	none apparent	notes (if applicable):	

Building:

Current Placard Status:	green		
Along — Damage ratio:	0%	Describe how damage ratio arrived at:	
Describe (summary):			
Across — Damage ratio:	0%		
Describe (summary):			
Diaphragms — Damage?:	no	Describe:	
CSWs: — Damage?:	no	Describe:	
Pounding: — Damage?:	no	Describe:	
Non-structural: — Damage?:	yes	Describe:	

$$Damage\_Ratio = \frac{(\%NBS(before) - \%NBS(after))}{\%NBS(before)}$$

Recommendations

Level of repair/strengthening required:	minor non-structural	Describe:	
Building Consent required:	no	Describe:	
Interim occupancy recommendations:	full occupancy	Describe:	
Along — Assessed %NBS before e'quakes:	35% (##### %NBS from IEP below)	If IEP not used, please detail assessment methodology:	Quantitative
Assessed %NBS after e'quakes:	35%		
Across — Assessed %NBS before e'quakes:	43% (##### %NBS from IEP below)		
Assessed %NBS after e'quakes:	43%		

IEP

Use of this method is not mandatory - more detailed analysis may give a different answer, which would take precedence. Do not fill in fields if not using IEP.

Period of design of building (from above): 1935-1965

h_n from above: m

Seismic Zone, if designed between 1965 and 1992:

not required for this age of building

not required for this age of building

	along	across
Period (from above):	0.4	0.4
(%NBS)nom from Fig 3.3:		

Note:1 for specifically design public buildings, to the code of the day: pre-1965 = 1.25; 1965-1976, Zone A =1.33; 1965-1976, Zone B = 1.2; all else 1.0

Note 2: for RC buildings designed between 1976-1984, use 1.2

Note 3: for buildngs designed prior to 1935 use 0.8, except in Wellington (1.0)

	along	across
Final $(\%NBS)_{nom}$:	0%	0%

2.2 Near Fault Scaling Factor

	along	across
Near Fault scaling factor, from NZS1170.5, cl 3.1.6:		
Near Fault scaling factor (1/N(T,D), **Factor A**:	#DIV/0!	#DIV/0!

2.3 Hazard Scaling Factor

Hazard factor Z for site from AS1170.5, Table 3.3:	
Z_{1992}, from NZS4203:1992	
Hazard scaling factor, **Factor B:**	#DIV/0!

2.4 Return Period Scaling Factor

Building Importance level (from above):	2
Return Period Scaling factor from Table 3.1, **Factor C**:	

2.5 Ductility Scaling Factor

	along	across
Assessed ductility (less than max in Table 3.2)		
Ductility scaling factor: =1 from 1976 onwards; or =kμ, if pre-1976, fromTable 3.3:		
Ductiity Scaling Factor, **Factor D**:	0.00	0.00

2.6 Structural Performance Scaling Factor:

Sp:		
Structural Performance Scaling Factor **Factor E**:	#DIV/0!	#DIV/0!

2.7 Baseline %NBS, $(NBS\%)_b = (\%NBS)_{nom}$ x A x B x C x D x E

$\%NBS_b$:	**#DIV/0!**	**#DIV/0!**

Global Critical Structural Weaknesses: (refer to NZSEE IEP Table 3.4)

3.1. Plan Irregularity, factor A:	insignificant	1
3.2. Vertical irregularity, Factor B:	insignificant	1
3.3. Short columns, Factor C:	insignificant	1
3.4. Pounding potential — Pounding effect D1, from Table to right		1.0
Height Difference effect D2, from Table to right		1.0
Therefore, Factor D:		1
3.5. Site Characteristics	insignificant	1

Table for selection of D1	Severe	Significant	Insignificant/none
Separation	0<sep<.005H	.005<sep<.01H	Sep>.01H
Alignment of floors within 20% of H	**0.7**	**0.8**	**1**
Alignment of floors not within 20% of H	**0.4**	**0.7**	**0.8**

Table for Selection of D2	Severe	Significant	Insignificant/none
Separation	0<sep<.005H	.005<sep<.01H	Sep>.01H
Height difference > 4 storeys	0.4	0.7	1
Height difference 2 to 4 storeys	0.7	0.9	1
Height difference < 2 storeys	1	1	1

3.6. Other factors, Factor F

	Along	Across
For ≤ 3 storeys, max value =2.5, otherwise max valule =1.5, no minimum		
Rationale for choice of F factor, if not 1		

Detail Critical Structural Weaknesses: (refer to DEE Procedure section 6)
List any: Refer also section 6.3.1 of DEE for discussion of F factor modification for other critical structural weaknesses

3.7. Overall Performance Achievement ratio (PAR)

	0.00	**0.00**

4.3 PAR x (%NBS)b:

PAR x Baselline %NBS:	**#DIV/0!**	**#DIV/0!**

4.4 Percentage New Building Standard (%NBS), (before)

	#DIV/0!

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