



Spencer Park Camping Ground
Homestead
Qualitative Engineering Evaluation

Reference: 228606
Prepared for:
Christchurch City Council

Functional Location ID: PRO 0157 B019

Revision: 2

Address: 100 Heyders Road, Spencerville

Date: 3 July 2013

Document Control Record

Document prepared by:

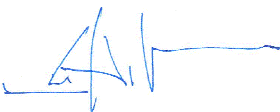

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Document control		aurecon				
Report Title		Qualitative Engineering Evaluation				
Functional Location ID		PRO 0157 B019	Project Number		228606	
File Path		P:\ 228606 - Spencer Park Camping Ground Homestead.docx				
Client		Christchurch City Council	Client Contact		Michael Sheffield	
Rev	Date	Revision Details/Status	Prepared	Author	Verifier	Approver
1	25 May 2012	Draft	C. Bong	C. Bong	L. Howard	L. Howard
2	3 July 2013	Final	L. Castillo	L. Castillo	L. Howard	L. Howard
Current Revision		2				

Approval			
Author Signature		Approver Signature	
Name	Luis Castillo	Name	Lee Howard
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Executive Summary

This is a summary of the Qualitative Engineering Evaluation for the Spencer Park Camping Ground Homestead 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	Spencer Park Camping Ground Homestead			
Building Location ID	PRO 0157 B019			Multiple Building Site	Y
Building Address	100 Heyders Road, Spencerville			No. of residential units	1
Soil Technical Category	N/A	Importance Level	2	Year Built	c. 1960s
Foot Print (m²)	c. 150	Storeys above ground	1	Storeys below ground	0
Type of Construction	Corrugated steel roof, lightweight timber purlins and rafters, timber walls with horizontal weatherboard cladding, timber floor diaphragm, timber pole foundation				

Qualitative L4 Report Results Summary

Building Occupied	Y	The Spencer Park Camping Ground Homestead is currently in use.
Suitable for Continued Occupancy	Y	The Spencer Park Camping Ground Homestead is 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	Y	The floor was within the DBH's Guidelines with falls of less than 1:200 or 0.5%.
Building %NBS From Analysis	Approx. 100%	Based on assumed approximate building material strength. Building falls within "low risk" category according to NZSEE guidelines.

Qualitative L4 Report Recommendations

Geotechnical Survey Required	N	A geotechnical survey is not required.
Proceed to L5 Quantitative DEE	N	A quantitative DEE is not required for this structure.

Approval

Author Signature		Approver Signature	
Name	Luis Castillo	Name	Lee Howard
Title	Senior Structural Engineer	Title	Senior Structural Engineer



1 Introduction

1.1 General

On 14 March 2012 Aurecon engineers visited the Spencer Park Camping Ground Homestead to undertake a qualitative building damage 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:

1. Assessment of the nature and extent of the building damage.
2. Visual assessment of the building strength particularly with respect to safety of occupants if the building is currently occupied.
3. 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 Qualitative Assessment of damage to the Spencer Park Camping Ground Homestead and is based on the Detailed Engineering Evaluation Guidelines as issued by the Engineering Advisory Group on 19 July 2011, visual inspections, available structural documentation as appropriate are attached herein.

2 Description of the Building

2.1 Building Age and Configuration

Based on the style and construction, Spencer Park Camping Ground Homestead is a 1960s single storey, light timber frame building. It has a corrugated iron roof, light weight timber purlins and rafters, horizontal weatherboard clad timber framed walls. Additionally in 2000, the building was relocated to its current location in the Spencer Park Camping Grounds and the building consent documentations show that the building is founded on 140 mm diameter timber pole pile foundations.

The approximate floor area of the building is 150 square metres and is classified as a Level 2 structure according to the New Zealand Loadings Code, NZS 1170 Part 0:2002.

2.2 Building Structural Systems Vertical and Horizontal

The vertical load resisting system consists of the corrugated iron roof, timber purlins and rafters. These are resisted by the lightweight timber framed walls. These loads are then transferred into the timber pile foundations.

The lateral load resisting system consists largely the same system with the addition of the gypsum plasterboard lining which stiffens the lightweight timber roof and timber framed walls and provides the required lateral load capacity.



2.3 Reference Building Type

The Spencer Park Camping Ground Homestead is a light timber framed structure clad in weatherboard. This style of construction is very common amongst the residential building stock in New Zealand.

Damage assessments undertaken in the wake of the Canterbury earthquakes has shown that these buildings have stood up well in seismic events. The low damage that was sustained can be attributed to the lightweight construction and the inherent ductility of these buildings. Damage to buildings of this nature typically consists of cracking of the brittle gypsum wall and ceiling linings.

2.4 Building Foundation System and Soil Conditions

Spencer Park Camping Ground Homestead is, as discussed above, founded on isolated timber pile foundation. This is classified as a Type A foundation according to the “Revised Guidance on Repairing and Rebuilding Houses affected by the Canterbury Earthquake Sequence”, prepared by the Department of Housing and Building in November 2011.

The land surrounding the Spencer Park Camping Ground Homestead was, at the time of writing classified as “rural and unmapped” according to the DHB Technical Classes dated 23 March 2012. It is of note that the residential property to the immediate east is classed as “Technical Category 3” or TC3 and according to CERA, “may suffer moderate to significant liquefaction in future significant earthquakes”.

2.5 Available Structural Documentation and Inspection Priorities

The original Spencer Park Camping Ground Homestead drawings were unavailable for review. The council files shows that the building was relocated to the Spencer Park Camping Grounds and had new walls fitted to increase the occupant capacity in 2001.

The inspection priorities for this building were a review of potential damage to foundations and consideration of wall bracing adequacy. Additionally there was potential for non-structural damage to brittle linings such as the plasterboard walls and ceiling claddings.

2.6 Available Survey Information

A levels survey was undertaken on the floor coverings of the building to quantify the level of any unevenness. The levels survey results were within the 1 in 200 or 0.5% slope threshold set by the Department of Building and Housing’s November 2011 Guidelines. Therefore no further action in the form of re-levelling is considered necessary.



3 Structural Investigation

3.1 Summary of Building Damage

The Spencer Park Camping Ground Homestead was in use at the time of the damage assessment. Generally, damage was evenly distributed throughout the building. However, damage was particularly concentrated in the North Western corner. A thorough visual damage assessment has shown;

- Splitting in the gypsum plasterboard wall in the North Western corner; and
- Opening of gaps in the gypsum plasterboard ceiling linings.

3.2 Record of Intrusive Investigation

The extent of damage was relatively minor and therefore intrusive investigations were considered unnecessary for Spencer Park Camping Ground Homestead.

3.3 Damage Discussion

The damage observed in the Spencer Park Camping Ground Homestead was relatively minor; it consisted primarily of cracking to the gypsum plasterboard on the walls and ceilings.

4 Building Review Summary

4.1 Building Review Statement

The level of finish of the Spencer Park Camping Ground Homestead impeded the viewing of most of the primary structural elements. Nevertheless, a non-intrusive damage assessment was undertaken assuming that the damage to the brittle claddings and finishes of the building would indicate a commensurate level of displacement damage on the building's structure.

4.2 Critical Structural Weaknesses

No specific critical structural weaknesses were identified as part of the building qualitative assessment.

5 Building Strength (Refer to Appendix C for Background Information)

5.1 General

The Spencer Park Camping Ground Homestead is a good example of New Zealand's 1960s light timber frame timber building stock. Buildings of this nature being lightweight and ductile have consequently resulted in relatively low displacement damage in the Canterbury earthquakes. The homestead is no exception to this, evidenced by the minor damage described in section 3.1 above.

5.2 Initial %NBS Assessment

The Spencer Park Camping Ground Homestead has not been subject to specific engineering design and the Initial Evaluation Procedure (IEP) will not give a useful estimate of building capacity in terms of percentage of new building strength. Nevertheless an estimate of lateral load capacity or bracing check can be made by adopting assumed values for strengths of existing materials and calculating the capacity of existing walls. Selected assessment seismic parameters are tabulated in the Table 1 below.

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	1.00	NZS 1170.5:2004, Table 3.5
Ductility Factor in Transverse Direction, μ	2.00	Plasterboard lined lightweight timber framed walls
Ductility Factor in Longitudinal Direction, μ	2.00	Plasterboard lined lightweight timber framed walls

The bracing check in both the longitudinal and transverse directions has shown that the building is capable of achieving approximately 100%NBS.

5.3 Results Discussion

The findings of the bracing check are consistent with the visual damage that was observed.

This quantitative analysis was undertaken using the assumed approximate bracing capacity of the timber wall lined with gypsum wall board according to the New Zealand Society of Earthquake Engineering (NZSEE) guidelines for the assessment and improvement of the structural performance of buildings in earthquakes.



6 Conclusions and Recommendations

As noted within the report, only low levels of visible damage was observed in the damage assessment and the levels survey has shown that the floor levels are within acceptable limits. This is further supported by the building strength analysis that was undertaken. It is therefore considered that the Spencer Park Camping Ground Homestead is **suitable for continued occupation**.

As there is no clear evidence of any liquefaction or ground movement in the vicinity of the Spencer Park Camping Ground Homestead **a geotechnical investigation is currently not considered necessary**.

7 Disclaimer

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 strengthened, 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.

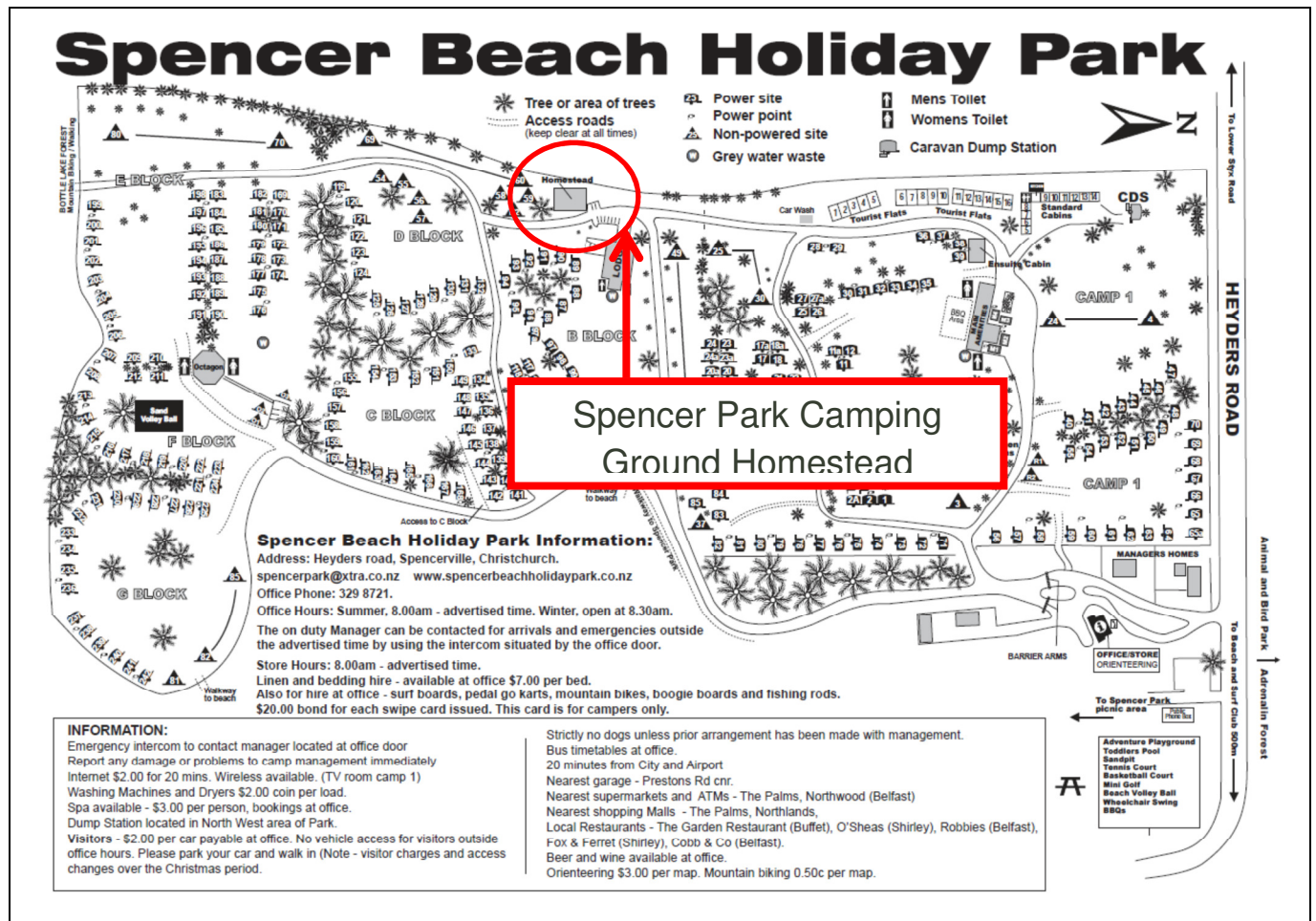
Appendices



Appendix A

Site Map, Photos and Levels Survey Results

Site photographs (14 March 2012)



Eastern elevation of the Homestead.



Northern elevation of the Homestead.



Timber bearer founded on a timber pole foundation typical around the perimeter.



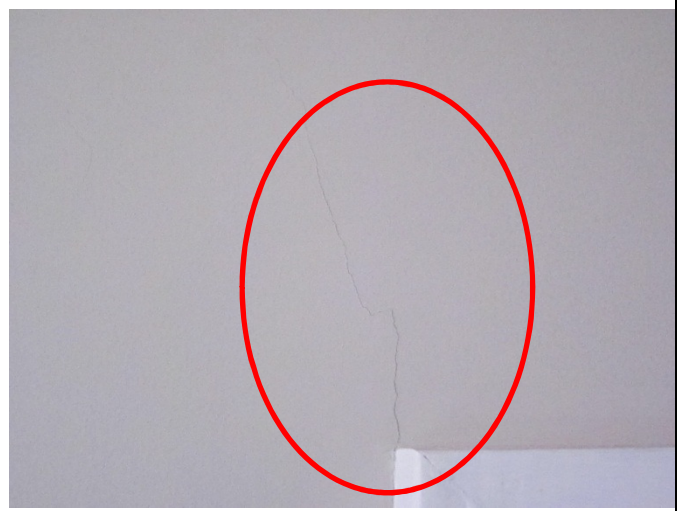
Opening of the joints between the soffit board.



Opening of the joints between the soffit board.



Cracking in the plasterboard above the door lintel in the North Western corner of the homestead.



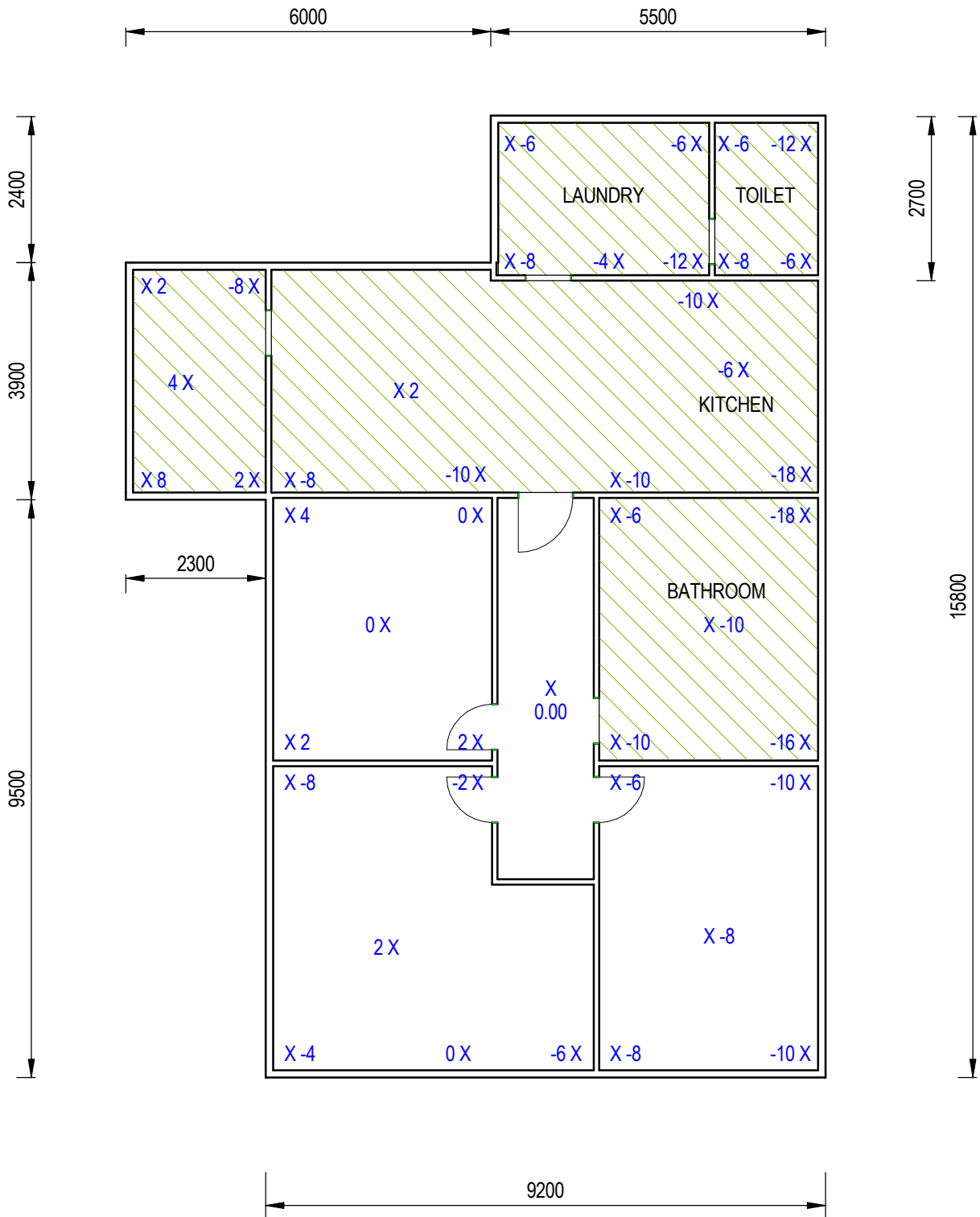
Cracking in the plasterboard above the door lintel in the North Western corner of the homestead.



Cracking in the plasterboard above the door lintel in the North Western corner of the homestead.



LEGEND:



27/11/2012 1:46:46 pm



REV	DATE	REVISION DETAILS	APPROVAL

DRAWN	DESIGNED
D.HUNIA	C.BONG
CHECKED	
Checker	
APPROVED	
	DATE
Approver	

PROJECT
100 HEYDERS ROAD SPENCERVILLE
TITLE
HOMESTEAD LEVEL SURVEY

PRELIMINARY NOT FOR CONSTRUCTION	
PROJECT No. 228606	
SCALE 1:100	SIZE A4
DRAWING No. S-01-02	REV

Appendix B

References

- Standards New Zealand, "AS/NZS 1170 Parts 0,1 and 5 and commentaries"
- Standards New Zealand, "NZS 3604:2011: Timber Framed Structures"
- Standards New Zealand, "NZS 4229:1999, Concrete Masonry Buildings Not Requiring Specific Design"
- Standards New Zealand, "NZS 3404:1997, Steel Structures Standard"
- Standards New Zealand, "NZS 3101:2006, Concrete Structures Standard"
- New Zealand Society for Earthquake Engineering (NZSEE), "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes June 2006"
- Engineering Advisory Group, "Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-Residential Buildings in Canterbury. Part 2 Evaluation Procedure. Revision 5, 19 July 2011"

Appendix C

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	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 D

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 Qualitative 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 qualitative assessment involves inspections of the building and a desktop review of existing structural and geotechnical information, including existing drawings and calculations, if available.

The purpose of the assessment is to determine the likely building performance and damage patterns, to identify any potential critical structural weaknesses or collapse hazards, and to make an initial assessment of the likely building strength in terms of percentage of new building standard (%NBS).

At the time of this report, no intrusive site investigation, detailed analysis, or modelling of the building structure had been carried out. Construction drawings were made available, and these have been considered in our evaluation of the building. The building description below is based on a review of the drawings and our visual inspections.

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 E

Standard Reporting Spread Sheet

Detailed Engineering Evaluation Summary Data

V1.11

Location		Building Name: <u>Homestead</u>	Unit No: <u>Street</u>	Reviewer: <u>Simon Manning</u>
Building Address: <u>Spencer Park Camping Ground</u>		100 <u>Heyders Road</u>		CPEng No: <u>132053</u>
Legal Description: <u>Lot 1 DP 44484</u>				Company: <u>Aurecon</u>
				Company project number: <u>228606</u>
				Company phone number: <u>03 375 0761</u>
GPS south: <u>43</u>		Degrees	Min	Sec
GPS east: <u>172</u>		<u>26</u>	<u>12</u>	<u>62</u>
Building Unique Identifier (CCO): <u>FRQ 0157 B019</u>				Date of submission: <u>3/07/2013</u>
				Inspection Date: <u>14/03/2013</u>
				Revision: <u>2</u>
				Is there a full report with this summary? <u>yes</u>

Site		Site slope: <u>flat</u>	Max retaining height (m): <u></u>
Site Class (to NZS1170.5): <u>D</u>		Soil type: <u>mixed</u>	Soil Profile (if available): <u></u>
Proximity to waterway (m, if <100m): <u></u>		If Ground improvement on site, describe: <u></u>	
Proximity to cliff top (m, if < 100m): <u></u>		Approx site elevation (m): <u>1.00</u>	
Proximity to cliff base (m, if <100m): <u></u>			

Building		No. of storeys above ground: <u>1</u>	single storey = 1	Ground floor elevation (Absolute) (m): <u>1.60</u>
Ground floor split? <u>0</u>				Ground floor elevation above ground (m): <u>0.60</u>
Stores below ground: <u>0</u>				If Foundation type is other, describe: <u></u>
Foundation type: <u>timber piles</u>		height from ground to level of uppermost seismic mass (for IEP only) (m): <u></u>		
Building height (m): <u>4.00</u>		Date of design: <u>1965-1976</u>		
Floor footprint area (approx): <u>140</u>				
Age of Building (years): <u>50</u>				
Strengthening present? <u>no</u>		If so, when (year)? <u></u>		
Use (ground floor): <u>multi-unit residential</u>		And what load level (%G)? <u></u>		
Use (upper floors): <u></u>		Brief strengthening description: <u></u>		
Use notes (if required): <u></u>				
Importance level (to NZS1170.5): <u>IL2</u>				

Gravity Structure		Gravity System: <u>load bearing walls</u>	rafter type, purlin type and cladding: <u>lightweight timber purlins and rafters, corrugated steel roof</u>
Roof: <u>timber framed</u>		Floors: <u>timber</u>	joist depth and spacing (mm): <u></u>
Beams: <u>timber</u>		Columns: <u>load bearing walls</u>	type: <u></u>
Walls: <u>load bearing walls</u>		typical dimensions (mm x mm): <u></u>	

Lateral load resisting structure		Lateral system along: <u>lightweight timber framed walls</u>	Note: Define along and across in detailed report!	note typical wall length (m): <u></u>
Ductility assumed, μ : <u>2.00</u>				estimate or calculation? <u>estimated</u>
Period along: <u>0.40</u>				estimate or calculation? <u>estimated</u>
Total deflection (ULS) (mm): <u></u>				estimate or calculation? <u>estimated</u>
maximum interstorey deflection (ULS) (mm): <u></u>				
Lateral system across: <u>lightweight timber framed walls</u>				note typical wall length (m): <u></u>
Ductility assumed, μ : <u>2.00</u>				estimate or calculation? <u>estimated</u>
Period across: <u>0.40</u>				estimate or calculation? <u>estimated</u>
Total deflection (ULS) (mm): <u></u>				estimate or calculation? <u>estimated</u>
maximum interstorey deflection (ULS) (mm): <u></u>				estimate or calculation? <u>estimated</u>

Separations:		north (mm): <u></u>	leave blank if not relevant
east (mm): <u></u>			
south (mm): <u></u>			
west (mm): <u></u>			

Non-structural elements		Stairs: <u></u>	describe: <u></u>
Wall cladding: <u>plaster system</u>			
Roof Cladding: <u></u>			
Glazing: <u>timber frames</u>			
Ceilings: <u>plaster, fixed</u>			
Services (list): <u>fire detection</u>			

Available documentation		Architectural: <u>partial</u>	original designer name/date: <u>original unavailable, only alterations and relocation plans available</u>
Structural: <u>partial</u>		original designer name/date: <u>original unavailable, only recommendations upon relocation available</u>	
Mechanical: <u>none</u>		original designer name/date: <u></u>	
Electrical: <u>none</u>		original designer name/date: <u></u>	
Geotech report: <u>none</u>		original designer name/date: <u></u>	

Damage		Site performance: <u></u>	Describe damage: <u>minor - none</u>
Settlement: <u>0-25mm</u>		notes (if applicable): <u></u>	
Differential settlement: <u>0-1.350</u>		notes (if applicable): <u></u>	
Liquefaction: <u>none apparent</u>		notes (if applicable): <u></u>	
Lateral Spread: <u>none apparent</u>		notes (if applicable): <u></u>	
Differential lateral spread: <u>none apparent</u>		notes (if applicable): <u></u>	
Ground cracks: <u>none apparent</u>		notes (if applicable): <u></u>	
Damage to area: <u>slight</u>		notes (if applicable): <u></u>	

Building:		Current Placard Status: <u>green</u>	
Along		Damage ratio: <u>0%</u>	Describe how damage ratio arrived at: <u></u>
Describe (summary): <u></u>			
Across		Damage ratio: <u>0%</u>	$Damage_Ratio = \frac{(\%NBS\ before) - (\%NBS\ after)}{\%NBS\ before}$
Describe (summary): <u></u>			
Diaphragms		Damage?: <u>no</u>	Describe: <u></u>
CSWs:		Damage?: <u>no</u>	Describe: <u></u>
Pounding:		Damage?: <u>no</u>	Describe: <u></u>
Non-structural:		Damage?: <u>yes</u>	Describe: <u>cracking in plasterboard</u>

Recommendations		Level of repair/strengthening required: <u>minor non-structural</u>	Describe: <u></u>
Building Consent required: <u>no</u>		Describe: <u></u>	
Interim occupancy recommendations: <u>full occupancy</u>		Describe: <u></u>	
Along		Assessed %NBS before: <u>100%</u>	0% %NBS from IEP below
Assessed %NBS after: <u>100%</u>		If IEP not used, please detail assessment methodology: <u>bracing check to NZS 3604:2011</u>	
Across		Assessed %NBS before: <u>100%</u>	0% %NBS from IEP below
Assessed %NBS after: <u>100%</u>			

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): <u>1965-1976</u>		h_b from above: <u>m</u>	
Seismic Zone, if designed between 1965 and 1992: <u>B</u>		not required for this age of building: <u></u>	
		not required for this age of building: <u></u>	
Period (from above): <u>0.4</u>		along: <u>0.4</u>	
(%NBS)nom from Fig 3.3: <u>0.0%</u>		across: <u>0.0%</u>	
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		<u>1.00</u>	
Note 2: for RC buildings designed between 1976-1984, use 1.2		<u>1.0</u>	

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

Final (%NBS)_{nom}:

along	0%
across	0%

2.2 Near Fault Scaling Factor

Near Fault scaling factor, from NZS1170.5, cl 3.1.6:

Near Fault scaling factor (1/N(T,D), **Factor A**):

along	1
across	1

2.3 Hazard Scaling Factor

Hazard factor Z for site from AS1170.5, Table 3.3:
 Z_{res}, from NZS4203:1992:
 Hazard scaling factor, **Factor B**:

2.4 Return Period Scaling Factor

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

2.5 Ductility Scaling Factor

Assessed ductility (less than max in Table 3.2):
 Ductility scaling factor: =1 from 1976 onwards; or =k_u, if pre-1976, from Table 3.3:

Ductility Scaling Factor, **Factor D**:

2.6 Structural Performance Scaling Factor:

Sp:
 Structural Performance Scaling Factor **Factor E**:

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

%NBS_b:

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

3.1. Plan Irregularity, factor A:

3.2. Vertical irregularity, Factor B:

3.3. Short columns, Factor C:

3.4. Pounding potential
 Pounding effect D1, from Table to right:
 Height Difference effect D2, from Table to right:
 Therefore, Factor D:

3.5. Site Characteristics:

Table for selection of D1	Severe	Significant	Insignificant/none
	Separation	0<sep<.005H	.005<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
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

For ≤ 3 storeys, max value =2.5, otherwise max value =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)

4.3 PAR x (%NBS)_b:

PAR x Baseline %NBS:

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



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