Spencer Park Camping Ground Office Block

Qualitative Engineering Evaluation

Reference: 228608

Prepared for:

Christchurch City Council

Functional Location ID: BU 0157 007 EQ2

Address: 100 Heyders Road, Spencerville

Revision: 2

Date: 11 January 2013

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Approval			
Author Signature		Approver Signature	
Name	Christopher Bong	Name	Luis Castillo
Title	Structural Engineer	Title	Senior Structural Engineer

Contents

Appendices

Executive Summary

This is a summary of the Qualitative Engineering Evaluation for the Spencer Park Camping Ground Office Block 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 Office Block			
Building Location ID	BU 0157 007 EQ2			**Multiple Building Site**	Y
Building Address	100 Heyders Road, Spencerville			**No. of residential units**	0
Soil Technical Category	NA	**Importance Level**	2	**Approximate Year Built**	1960s
Foot Print (m²)	200	**Storeys above ground**	1	**Storeys below ground**	0
Type of Construction (Office Block)	Corrugated steel roof, light timber roof with purlins and rafters, timber stud wall cladded in horizontal weather board founded on a concrete pad foundation.				
Type of Construction (Café Attachment)	Sail roof held up by stands, solid filled concrete masonry wall founded on a concrete pad foundation.				
Qualitative L4 Report Results Summary					
Building Occupied	Y	The Spencer Park Camping Ground Office Block is currently in use.			
Suitable for Continued Occupancy	Y	The Spencer Park Camping Ground Office Block 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. 73%	Based on assumed approximate building material strength. "Low risk" category according to NZSEE guidelines refer Figure C1 in Appendix C.			
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	Christopher Bong	Name	Luis Castillo		
Title	Structural Engineer	Title	Senior Structural Engineer		

1 Introduction

1.1 General

On 14 March 2012 Aurecon engineers visited the Spencer Park Camping Ground Office Block 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:

- 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 Qualitative Assessment of damage to the Spencer Park Camping Ground Office Block 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 summary calculations as appropriate.

2 Description of the Building

2.1 Building Age and Configuration

The Spencer Park Camping Ground Office Block is a timber framed wall building built in the 1960s. The building is clad in horizontal weatherboards and is founded on a concrete foundation. The original building has undergone several renovations and alterations post-construction which included the park ranger's office and reception area.

A notable post-construction addition is the café. The perimeter walls are constructed of solid filled concrete masonry blocks and the roof of the café is made of sail cloth, held up with posts. The approximate floor area of the building is 200 square metres and is classified as Importance Level 2 Structure according to NZS 1170 Part 0: 2002.

2.2 Building Structural Systems Vertical and Horizontal

The original office block and the post-construction café addition are structurally isolated i.e. the load paths for both buildings are distinct from one another. This is evidenced by the unattached roof systems and free standing concrete masonry walls.

The vertical loads of the office block are resisted primarily by the timber framed walls, with the exception of the pop up roof and veranda, which are held up by lightweight timber beams and columns.

The horizontal load paths in the along and across directions, like the vertical loads, can be traced through the timber roof to the concrete pad foundation via the timber framed walls.

The vertical and horizontal load paths of the café addition are distinct; vertical loads are resisted by the roof stands, while the lateral loads are resisted in shear by the concrete masonry walls.

2.3 Reference Building Type

The Spencer Park Camping Ground Office Block consists of two distinct buildings types of different construction materials and eras both of which are inherently robust and common within New Zealand's building stock.

- The original office building is of timber frame wall construction
- The later café addition is of concrete masonry wall construction

Expected seismic damage for buildings of this nature typically consists of:

- Cracking in the mortar joints, a consequence of inadequate shear or flexural strength in concrete masonry wall buildings
- Cracking in brittle claddings such as gypsum plasterboard, due to higher than tolerable displacements, in timber framed wall buildings

2.4 Building Foundation System and Soil Conditions

The Spencer Park Camping Ground Office Block is founded on a concrete pad foundation. The land surrounding the Spencer Park Camping Ground Office Block, was 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

Unfortunately, the only documentation available at the time of writing was the building consent application for office space addition to original building dated November 1985. Appended within this documentation was a copy of the original drawings for the cross section of the pop up roof.

From this information, it was inferred that the building was built c. 1960s as evidenced by the imperial units on the original drawings appended to the building consent documentation. The work for the additional floor space, added onto the original building, was carried out in 1985 according to the building permit application. It is suspected that the building has undergone at least one further alteration or renovation since then as the original wooden joinery has now been replaced by de novo aluminium joinery. The concrete masonry walls were not noted in the November 1985 building permit and thus assumed to be of more recent construction.

The inspection priorities for this report are the review of damage to the building and consideration of the bracing adequacy of the building.

2.6 Available Survey Information

A levels survey was undertaken on the floor coverings of the building to quantify the level of post-construction subsidence. 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 or rebuilding was considered necessary.

3 Structural Investigation

3.1 Summary of Building Damage

The Spencer Park Camping Ground Office Block was in use at the time of the damage assessment. A thorough visual damage assessment has shown no visible damage to the building.

3.2 Record of Intrusive Investigation

The extent of damage was relatively minor and therefore, an intrusive investigation was neither warranted nor undertaken. Furthermore, most of the structure was visible internally.

3.3 Damage Discussion

There was no visible damage observed in the Spencer Park Camping Ground Office Block.

4 Building Review Summary

4.1 Building Review Statement

The internal cladding of the Spencer Park Camping Ground Office Block prevented the viewing of the primary structural elements. Nevertheless, a non-intrusive damage assessment was undertaken assuming that the damage seen on the brittle sheeting would indicate a proportional level of displacement damage to the 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 Office Block has been constructed and added to over time in a variety of styles and materials. Nevertheless, as evidenced by the lack of damage, the building has performed well.

The Spencer Park Camping Ground Office Block is, as discussed above, constructed c. 1960s with subsequent additions and alterations. Buildings of this nature and era have generally stood up relatively well in the recent seismic events due to the intrinsic robustness of construction as evidenced by the lack of associated displacement damage described in section 3.1 above.

5.2 Initial %NBS Assessment

The Spencer Park Camping Ground Office Block 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 standard. 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 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, Importance Level 2 Structure with a Design Life of 50 years
Ductility Factor for the timber framed wall building, μ	1.25	Plasterboard lined lightweight timber framed walls
Ductility Factor for the concrete masonry wall addition, μ	3.00	Lightly reinforced, partially filled concrete masonry walls

The bracing check in both the longitudinal and transverse directions has shown that the building is capable of achieving approximately 73%NBS (i.e. a "low risk" building according to NZSEE guidelines).

5.3 Results Discussion

The findings of the bracing check are consistent with the observed damage in the visual damage assessment. The 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, no visible damage was found 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 Office Block 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 Office Block **a geotechnical investigation is currently not considered necessary.**

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 (where available) 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 replaced 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.

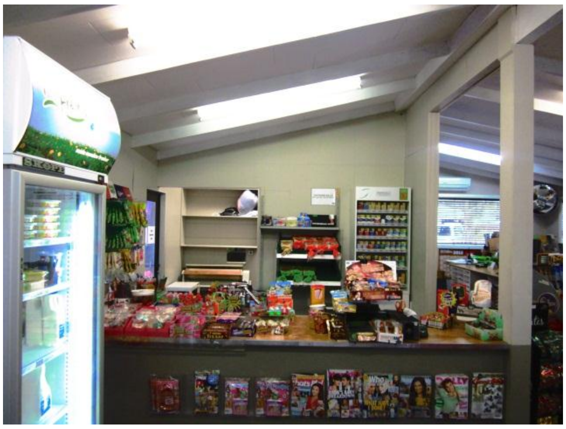
Appendices

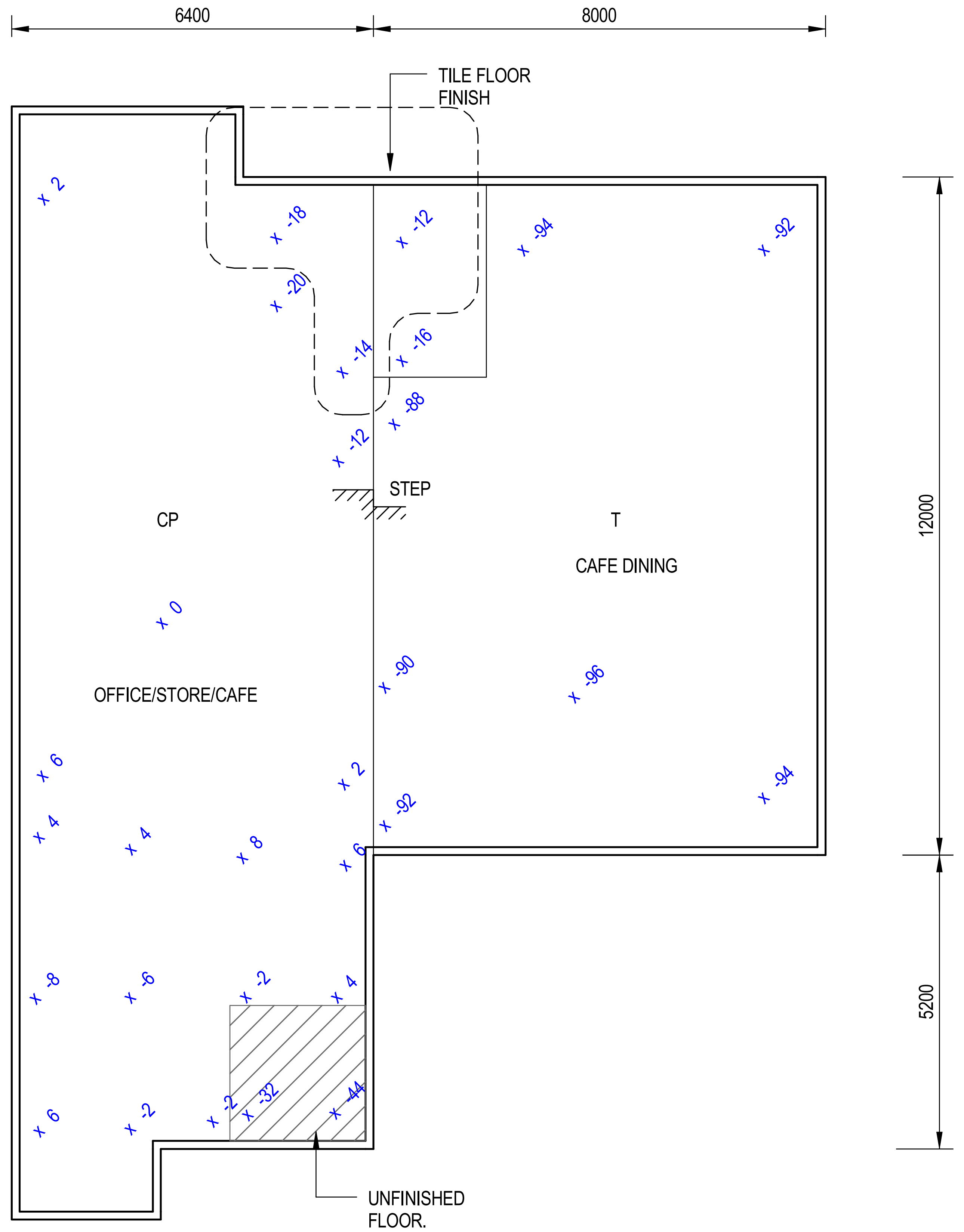
Appendix A

Site Map, Photos and Levels Survey,

14 March 2012 – Spencer Park Camping Ground Office Block Site Photographs

West elevation of the Office Block - note the original timber framed wall building on the left and the café addition of the right.

View of the pop up roof within the original timber building.	
View beneath the pop up roof showing the lightweight timber beams, columns as well as timber framed walls.	
View inside the café showing a typical post which supports up the sail roof.	



GROUND LEVEL

1 : 100

MAXIMUM VARIATIION ACROSS GROUND LEVEL = 8mm

LEGEND:

C = CONCRETE
CP= CARPET
T= TILE
0 = REFERENCE POINT

NOTES:

1. FLOOR PLANS AND DIMENSIONS ARE APPROXIMATE ONLY
2. FLOOR LEVEL SURVEY CARRIED OUT ON 19/09/2012

27/11/2012 3:44:38 p.m.

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CLIENT
Christchurch City Council

REV	DATE	REVISION DETAILS	APPROVAL
A	-	ISSUED FOR INFORMATION	

DRAWN	DESIGNED
T.DOWN	H.BURNETT

CHECKED
Checker

APPROVED
DATE
Approver

PROJECT
SPENCERVILLE CAMPING GROUND
OFFICE BLOCK

TITLE
FLOOR LEVEL SURVEY

PRELIMINARY
NOT FOR CONSTRUCTION

PROJECT No.
228608

SCALE	SIZE
1 : 100	A3

DRAWING No.	REV
S-01-00	A

Appendix B
References

1. Department of Building and Housing (DBH), “Revised Guidance on Repairing and Rebuilding Houses Affected by the Canterbury Earthquake Sequence”, November 2011

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

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

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

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

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

7. Standards New Zealand, “NZS 3404 Part 1, Steel Structures Standard”, 1997

8. Standards New Zealand, “NZS 3603, Timber Structures Standard”, 1993

9. Standards New Zealand, “NZS 3604, Timber Framed Structures”, 2011

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

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

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).

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

Detached Engineering Evaluation Summary Data V1.11

Location

Building Name:	Office Block			Reviewer:	Lee Howard
		No:	Street	CPEng No:	1008889
Building Address:	Spencer Park Camping Ground		100 Heyders Road	Company:	Aurecon
Legal Description:	Lot 1 DP 44484			Company project number:	228608
				Company phone number:	03 375 1328
	Degrees	Min	Sec		
GPS south:	43	25	50.04	Date of submission:	May
GPS east:	172	42	19.00	Inspection Date:	March
				Revision:	1
Building Unique Identifier (CCC):	BU 0157 007 EQ2			Is there a full report with this summary?	yes

Site

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

Building

No. of storeys above ground:	1	single storey = 1	Ground floor elevation (Absolute) (m):	1.00
Ground floor split?			Ground floor elevation above ground (m):	0.00
Storeys below ground	0			
Foundation type:	raft slab		if Foundation type is other, describe:	
Building height (m):	3.60		height from ground to level of uppermost seismic mass (for IEP only) (m):	
Floor footprint area (approx):	200			
Age of Building (years):	50		Date of design:	1935-1965
Strengthening present?	no		If so, when (year)?	
			And what load level (%g)?	
Use (ground floor):	retail		Brief strengthening description:	
Use (upper floors):				
Use notes (if required):				
Importance level (to NZS1170.5):	IL2			

Gravity Structure

Gravity System:	load bearing walls		
Roof:	timber framed	rafter type, purlin type and cladding	lightweight timber purlins and rafters
Floors:	concrete flat slab	slab thickness (mm)	
Beams:	timber	type	
Columns:	timber	typical dimensions (mm x mm)	100 mm square
Walls:	partially filled concrete masonry	thickness (mm)	190

Lateral load resisting structure

Lateral system along:	lightweight timber framed walls	**Note: Define along and across in detailed report!**	note typical wall length (m)	
Ductility assumed, μ:	3.00			
Period along:		0.00	estimate or calculation?	estimated
Total deflection (ULS) (mm):			estimate or calculation?	estimated
maximum interstorey deflection (ULS) (mm):			estimate or calculation?	estimated

Lateral system across:	lightweight timber framed walls		note typical wall length (m)	
Ductility assumed, μ:	3.00			
Period across:		0.00	estimate or calculation?	estimated
Total deflection (ULS) (mm):			estimate or calculation?	estimated
maximum interstorey deflection (ULS) (mm):			estimate or calculation?	estimated

Separations:

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

Non-structural elements

Stairs:			
Wall cladding:	plaster system	describe	
Roof Cladding:	Metal	describe	corrugated iron
Glazing:	aluminium frames		
Ceilings:	plaster, fixed		
Services(list):			

Available documentation

Architectural	partial	original designer name/date	1985 extention
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:		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?:	no	Describe:	

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

Recommendations

Level of repair/strengthening required:	none	Describe:	
Building Consent required:	no	Describe:	
Interim occupancy recommendations:	full occupancy	Describe:	

Along	Assessed %NBS before:	73%	0% %NBS from IEP below	If IEP not used, please detail assessment methodology:	bracing check to NZS 3604:2011
	Assessed %NBS after:	73%			
Across	Assessed %NBS before:	73%	0% %NBS from IEP below		
	Assessed %NBS after:	73%			

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: B

not required for this age of building

not required for this age of building

	along	across
Period (from above):	0	0
(%NBS)nom from Fig 3.3:	0.0%	0.0%

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	1.00
Note 2: for RC buildings designed between 1976-1984, use 1.2	1.0
Note 3: for buildngs designed prior to 1935 use 0.8, except in Wellington (1.0)	1.0

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

2.2 Near Fault Scaling Factor

Near Fault scaling factor, from NZS1170.5, cl 3.1.6: 1.00

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

2.3 Hazard Scaling Factor

Hazard factor Z for site from AS1170.5, Table 3.3:	0.30
Z_{1992}, from NZS4203:1992	
Hazard scaling factor, **Factor B:**	3.333333333

2.4 Return Period Scaling Factor

Building Importance level (from above):	2
Return Period Scaling factor from Table 3.1, **Factor C**:	1.00

2.5 Ductility Scaling Factor

	along	across
Assessed ductility (less than max in Table 3.2)	2.00	2.00
Ductility scaling factor: =1 from 1976 onwards; or $=k_\mu$, if pre-1976, fromTable 3.3:	2.00	2.00
Ductiity Scaling Factor, **Factor D**:	2.00	2.00

2.6 Structural Performance Scaling Factor:

	along	across
Sp:	0.700	0.700
Structural Performance Scaling Factor **Factor E**:	1.428571429	1.428571429

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

	along	across
$\%NBS_b$:	**0%**	**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	significant	0.7

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

		Along	Across
3.6. Other factors, Factor F	For ≤ 3 storeys, max value =2.5, otherwise max valule =1.5, no minimum	1.0	1.0
	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

		Along	Across
3.7. Overall Performance Achievement ratio (PAR)		**0.70**	**0.70**
4.3 PAR x (%NBS)b:	PAR x Baselline %NBS:	**0%**	**0%**
4.4 Percentage New Building Standard (%NBS), (before)			**0%**

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