Mairehau Public Library
Qualitative Engineering Evaluation

Reference: 227678

Prepared for:

Christchurch City Council

Functional Location ID: BU 0642 001 EQ2

Address: 42A Kensington Avenue

Revision: 2

Date: 18 December 2012

Document Control Record

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1	**15 June 2012**	Draft	N. Bednarek	S.Manning	F. Lanning	F. Lanning	
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Approval			
Author Signature		Approver Signature	
Name	Luis Castillo	Name	Forrest Lanning
Title	Senior Structural Engineer	Title	Senior Structural Engineer

Contents

Appendices

Executive Summary

This is a summary of the Qualitative Engineering Evaluation for the Mairehau Public Library 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	Mairehau Public Library			
Building Location ID	BU 0642 001 EQ2			**Multiple Building Site**	N
Building Address	42A Kensington Avenue			**No. of residential units**	0
Soil Technical Category	TC2	**Importance Level**	2	**Approximate Year Built**	1964
Foot Print (m²)	220	**Storeys above ground**	1	**Storeys below ground**	0
Type of Construction	Steel frame and light roof with light timber frame walls on concrete slab on grade				
Qualitative L4 Report Results Summary					
Building Occupied	Y	Currently in use as a library.			
Suitable for Continued Occupancy	Y	Is considered suitable for continued occupancy.			
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	Floor levels were within acceptable limits. No significant seismic levels damage was observed.			
Building %NBS From Analysis	85%	Low earthquake risk based on engineering calculations.			
Qualitative L4 Report Recommendations					
Geotechnical Survey Required	N	No significant liquefaction or settlement evident in the surrounding area.			
Proceed to L5 Quantitative DEE	N	A quantitative DEE is not required for this structure.			
Approval					
Author Signature		Approver Signature			
Name	Luis Castillo	Name	Forrest Lanning		
Title	Senior Structural Engineer	Title	Senior Structural Engineer		

1 Introduction

1.1 General

On 13 January 2012 Aurecon engineers visited the Mairehau Public Library to carry out 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 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 Mairehau Public Library at 42A Kensington Avenue, Mairehau 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 Mairehau Library is made up of two single storey connected buildings. The first being a very small early 1900's lightweight timber building with a floor area of 40 square meters. The second newer part of the complex was built in 1964 and consists of steel framing with gypsum lined timber shear walls. The steel beams and columns support butynol on particle board roofing that is supported by purlins spanning between the steel roof framing. The total floor area is 180 square meters. The complex is used as a public library and is considered an importance level 2 structure in accordance with AS/NZS 1170 Part 0:2002.

2.2 Building Structural Systems Vertical and Horizontal

Lateral loads are resisted by gypsum lined timber frames in both directions. The vertical gravity loads are resisted by the steel frames and the load bearing timber walls. The lightweight roofing load is carried by timber purlins. The load is then transferred to the steel primary truss beams. This load is then transferred to the foundation through timber walls and steel columns. The structure is supported by a concrete slab on hard fill foundation.

2.3 Reference Building Type

This is an unusual structure designed by an Architect working for Christchurch City Council in the modernist style in 1964. This building is a fore runner of much more recent contemporary design using steel and timber. This is not a generic building that is mentioned in the engineering advisory board guidelines Appendix A.

2.4 Building Foundation System and Soil Conditions

The foundation consists of a cast-in-place concrete slab on a perimeter concrete footing and hard fill base. Soil in this area is categorised as technical category 2 (TC2) yellow meaning that it may be susceptible to liquefaction and associated settlement in future large earthquakes and may require specific design for foundations. No evidence of settlement or liquefaction was observed in the vicinity.

2.5 Available Structural Documentation and Inspection Priorities

Original building consent drawings were available for review and a drawing review was carried out. The main potential issues highlighted by the drawing review were the steel framing and the integrity of the connections. The drawings also indicate a layer of compacted hard fill built up below the slab and footings. An inspection of the integrity of the floor slab was a priority to identify possible damage from liquefaction and ground movement.

2.6 Available Survey Information

A levels survey was carried and the results of the survey are attached in Appendix A. The survey results indicate that the 1964 library extension floor levels are within acceptable limits. The earlier original children's library, although with acceptable limits, shows sign of significant settlement. Due to the age of the part of the library the condition of the floor is very likely due to the age of this small older part of the library rather than due to the effect of the earthquakes.

3 Structural Investigation

3.1 Summary of Building Damage

The Mairehau Library is currently in use. The librarian was available and was helpful in providing access.

Steel beams and columns supporting the roof were visible on inspection. Only minor damage to linings at the connections between the columns and beams was identified. Also specifically inspected was the integrity of the concrete perimeter foundation, some minor cracking was noted. Cracking was also noted on the landing outside the original building. Additionally some minor cracking was observed in the concrete masonry brick veneer cladding.

There were no visible deformations in the surrounding land due to liquefaction and settlement.

3.2 Record of Intrusive Investigation

Many of the primary structural elements of the Mairehau Library were visible and, given the minor nature of the observed displacement damage, it was concluded that an intrusive investigation was not required.

3.3 Damage Discussion

Cracking identified on the slab was localised and most likely due to differential settlement over time and unrelated to the earthquakes. The minor damage to the foundation is not considered significant will not influence the structure's ability to resist the gravity and lateral loads. Minor cracking in the block work veneer does not affect structural seismic capacity.

4 Building Review Summary

4.1 Building Review Statement

A representative sample of the primary structural components of the Mairehau Library was visible on inspection. From the lack of significant cracking and other displacement damage it has been inferred that the integrity of the building's primary structure has been maintained. To make this judgement It has been assumed the building was built in accordance with the original drawings. Although minor cracks were observed in the building's concrete perimeter foundation, due to the very minor nature of the damage, the foundation has been inferred as adequate.

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 building has performed well in the Canterbury earthquake sequence as evidenced by the lack of noted damage in Section 3 above.

5.2 Initial %NBS Assessment

A qualitative assessment was done to check the specific %NBS. The Mairehau library building does not appear to be a structurally optimised structure. Construction plans stamped Sept 1964 indicate that this building was designed in the period of 1935 to 1965.

The lateral load resisting mechanism of the buildings was identified as timber framing with gypsum board linings. These walls were positioned predominantly around the perimeter of the building. The horizontal earthquake demand was calculated based on NZS 1170.5 and checked with the building's calculated capacity to resist the load from assumed material strengths for the existing structure. From this the %NBS was found to be 85% in both the transverse and longitudinal direction.

5.3 Results Discussion

Based on the qualitative %NBS assessment this building falls into the low earthquake risk category. Due to the lack of visible damage to the structure it is our opinion that this building acceptably meets the calculated 85%NBS.

6 Conclusions and Recommendations

The land below the Mairehau Library is zoned TC2 and as such has been identified as somewhat prone to liquefaction and settlement. However there is minimal evidence of settlement and liquefaction in the area and only very minor foundation damage was observed.

Due to the acceptable %NBS (85%) that categorises the building as a low earthquake risk structure no further assessment is recommended.

The building is currently occupied and in use as a library room and in our opinion it is considered suitable for continued occupation.

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.

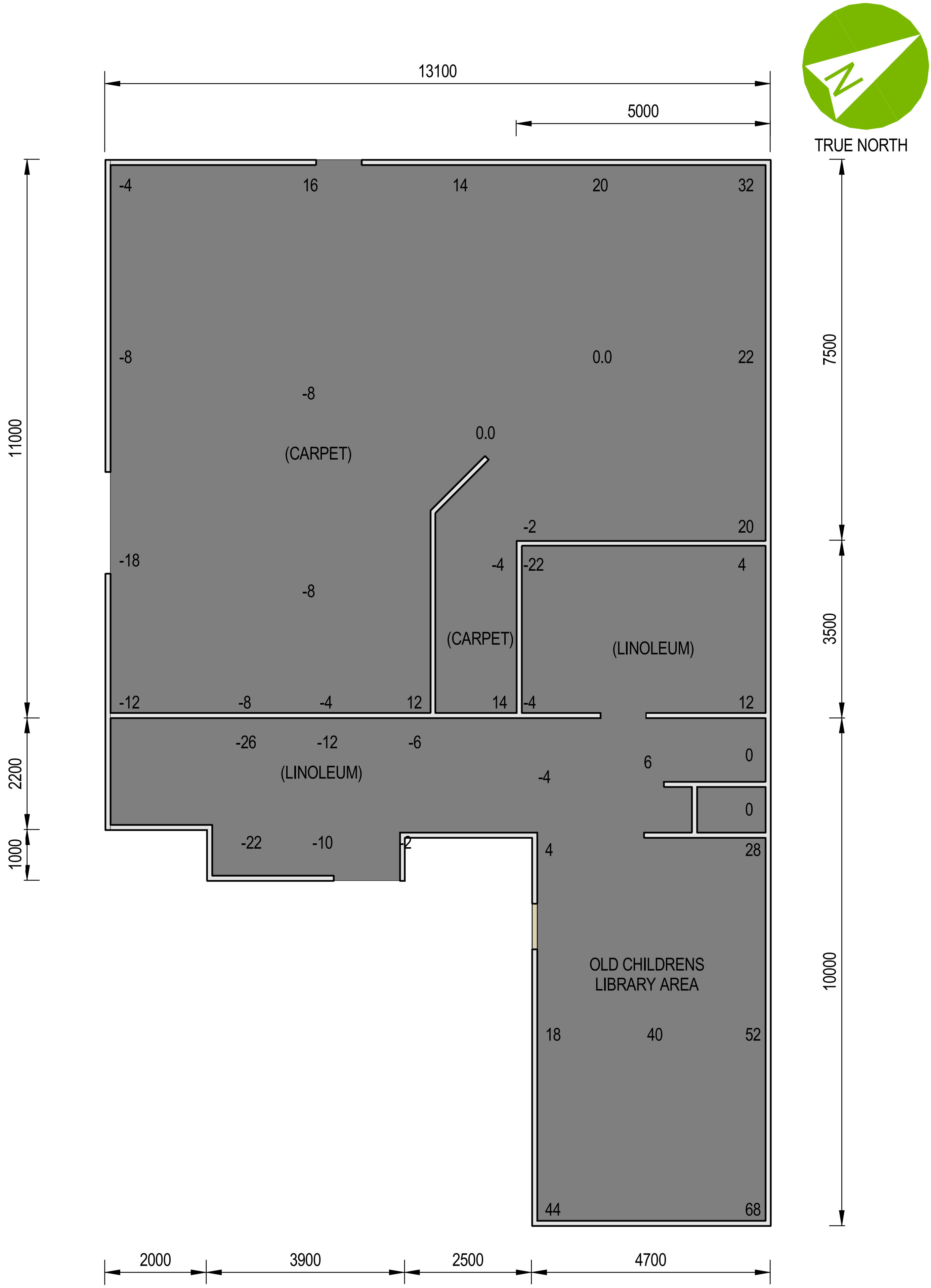
Appendices

Appendix A
Photos and Levels Survey

13 January 2012 – Mairehau Public Library Site Photographs

South-West elevation of the Mairehau Public Library.	
North-East elevation of the Mairehau Public Library.	
Minor cracking on masonry veneer.	

Steel secondary beams.	
Tension cracking on footpath.	
Clearspan of beams	
Minor damage to gypsum at the beam-column connection (recently painted).	



27/11/2012 12:03:20 p.m.

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CLIENT
Christchurch City Council

REV	DATE	REVISION DETAILS	APPROVAL
1	29-05-12	LEVEL SURVEY	L.HOWARD

DRAWN	DESIGNED
D.LAKE	L.CASTILLO

CHECKED: D.ELLIOTT

APPROVED: L.HOWARD
DATE

PROJECT: MAREHAU PUBLIC LIBRARY CHRISTCHURCH

TITLE: FLOOR LEVELS PLAN

CONSENT

PROJECT No.: 227678

SCALE	SIZE
1 : 100	A4

DRAWING No.	REV
S-01-00	1

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

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Mairehau Library			Reviewer:	Simon Manning
	Unit	No:	Street	CPEng No:	132053
Building Address:		42a	Kensington Avenue	Company:	Aurecon
Legal Description:				Company project number:	227678
				Company phone number	(03) 3660821
	Degrees	Min	Sec		
GPS south:	43	30	2.98	Date of submission:	21/02/2012
GPS east:	172	38	30.88	Inspection Date:	1/12/2011
				Revision:	
Building Unique Identifier (CCC)	BU 0642-001 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):	7.00

Building

No. of storeys above ground:	1	single storey = 1	Ground floor elevation (Absolute) (m):	7.50
Ground floor split?	no		Ground floor elevation above ground (m)	0.30
Storeys below ground				
Foundation type	other (describe)		if Foundation type is other, describe	Concrete Pad
Building height (m):	3.70		height from ground to level of uppermost seismic mass (for IEP only) (m):	3
Floor footprint area (approx):	210			
Age of Building (years):	48		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):	Suburban Public Library			
Importance level (to NZS1170.5):	IL2			

Gravity Structure

Gravity System:	load bearing walls		
Roof:	other (note)	describe system	Steel and Timber Framed Light Roof
Floors:	other (note)	describe sytem	Concrete Slab on Grade at Ground Leve
Beams:			
Columns:			
Walls:			

Lateral load resisting structure

Note: Define along and across in detailed report!

Lateral system along:	lightweight timber framed walls		note typical wall length (m)	6
Ductility assumed, μ:	3.00			
Period along:	0.40	0.00	estimate or calculation?	estimated
Total deflection (ULS) (mm):	30		estimate or calculation?	estimated
maximum interstorey deflection (ULS) (mm):	30		estimate or calculation?	estimated
Lateral system across:	lightweight timber framed walls		note typical wall length (m)	6
Ductility assumed, μ:	3.00			
Period across:	0.40	0.00	estimate or calculation?	estimated

Total deflection (ULS) (mm):	30	estimate or calculation?	estimated
maximum interstorey deflection (ULS) (mm):	30	estimate or calculation?	estimated

Separations:

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

Non-structural elements

Stairs:			
Wall cladding:	brick or tile	describe (note cavity if exists)	
Roof Cladding:	Other (specify)	describe	Hypalon
Glazing:			
Ceilings:	plaster, fixed		
Services(list):			

Available documentation

Architectural	full	original designer name/date	Christchurch City Council / 1964
Structural		original designer name/date	
Mechanical		original designer name/date	
Electrical		original designer name/date	
Geotech report		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:	0-20mm/20m	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:	minor damage to GIB

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

Recommendations

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

Along	Assessed %NBS before:	85%	##### %NBS from IEP below	If IEP not used, please detail assessment methodology:
	Assessed %NBS after:	85%		
Across	Assessed %NBS before:	85%	##### %NBS from IEP below	
	Assessed %NBS after:	85%		

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: 3m

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

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

	along	across
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**:	1.00

2.5 Ductility Scaling Factor

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

2.6 Structural Performance Scaling Factor:

	along	across
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

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

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

3.1. Plan Irregularity, factor A:		1
3.2. Vertical irregularity, Factor B:		1
3.3. Short columns, Factor C:		1

Table for selection of D1	Severe	Significant	Insignificant/none
Separation	0<sep<.005H	.005<sep<.01H	Sep>.01H

3.4. Pounding potential	Pounding effect D1, from Table to right	
	Height Difference effect D2, from Table to right	
	Therefore, Factor D:	0

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

3.5. Site Characteristics

		Along	Across
3.6. Other factors, Factor F	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

		Along	Across
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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