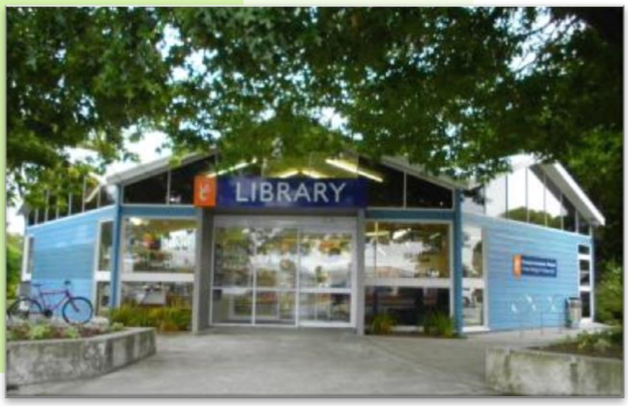


aurecon

Project: Redwood Library

Qualitative Engineering Evaluation

Prepared for: Christchurch City Council

Project: 227998

1 July 2013

Building Functional Location ID : PRO 2179 002

Building Name : Redwood Library

Building Address : 339 Main North Road

Document Control Record

Document prepared by:

Aurecon New Zealand Limited
Level 2, 518 Colombo Street
Christchurch 8011
PO Box 1061
Christchurch 8140
New Zealand

T +64 3 366 0821
F +64 3 379 6955
E christchurch@aurecongroup.com
W aurecongroup.com

Document control						aurecon
Report Title		Qualitative Engineering Evaluation				
Document ID			**Project Number**		227998	
File Path		\\aurecon\shares\NZCHC\Projects\227998\Redwood Library				
Client		Christchurch City Council	**Client Contact**		Micheal Sheffeild	
Rev	**Date**	**Revision Details/Status**	**Prepared by**	**Author**	**Verifier**	**Approver**
1	**13 April 2012**	Preliminary	SKM	SKM	DH	DH
2	1 July 2013	Final	SKM	SKM	DH	DH
Current Revision		**1**				

Approval			
Author Signature		Approver Signature	
Name	Simon Manning	Name	Deborah Hegarty
Title	Senior Structural Engineer	Title	Senior Structural Engineer

Contents

1. Executive Summary

This is a summary of the Qualitative Report for the Redwood Library building structure 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.

Building Details	**Name**	Redwood Library		**BuildLoc ID:**	PRO 2179 002
Building Address	339 Main North Road				
Foot Print m^2	500	**Stories above ground**	1	**Stories below ground**	0
Approximate Year Built	1970's	**Approx. Building Age Yrs**	35	**Number of res. units**	0
Building Current Use	Library/Early Childhood Centre				
Type of Construction	Library – Steel Frame, Early Childhood Centre – Light timber frame				

Qualitative L4 Report Results Summary		
Building Occupied	Y	The Library and Early Childhood Centre are occupied by staff and children.
Suitable for Continued Occupancy	Y	Both parts of building are considered safe for continued occupancy.
Critical Structural Weaknesses	N	No critical structural weaknesses were found.
Initial Building %NBS	Y	Building capacity is assessed as greater than 70% NBS for both parts of building
Key Damage Summary	Y	Refer to summary of building damage section 4.1 report body.

Qualitative L4 Report Recommendations		
Levels Survey Required	Done	Levels survey results are within acceptable limits.
Geotechnical Survey Required	N	This may be informed by levels survey however initial assessment indicates that damage due to soils failure is insufficient to warrant specific investigation.
Multiple Structure Site	N	
L4 Quantitative DEE Recommendation		It is recommended that this report be considered **Final.**

Approval			
Author Signature	[signature]	Approver Signature	[signature]
Name	Simon Manning	Name	Deborah Hegarty
Title	Senior Structural Engineer	Title	Senior Structural Engineer

2. Introduction

2.1 General

On 13 February 2012 Aurecon engineers visited the Redwood 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 Redwood Library at 339 Main North Road 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.

3. Description of the Building

3.1 Building Age and Configuration

Redwood Library was the original building, with the Early Childhood Centre as a later addition. The building is single storey with a high level steel roof structure over the library creating an octagonal shape in plan. The Early Childhood Centre is occupied by children and staff during the day. The library is also in use with staff and the public occupying the building. The complex is approximately 500 square meters in floor area and is considered to be an importance level 2 structure.

3.2 Building Structural Systems Vertical and Horizontal

The octagonal roof structure of the library is supported by steel frames radiating out from a ring beam in the centre. At the perimeter steel girts span between frame legs tying the frame legs together to form a semi-frame with weak axis bending in legs. Clerestory windows occur in most places above the steel girts however the frame steel leg can provide an adequate transfer mechanism to get load into the girt and the lined timber framed walls below. Below the steel girt lined timber framed walls occur apart from at the entrance where the entire bay is glazed. The Early Childhood Centre is a light timber frame building with a large span ridge beam over the main play area. A slab on grade pad foundation extends throughout the entire building.

3.3 Reference Building Type

The Redwood library is single story welded steel frame structure with the addition of a standard light timber framed single story slab on grade structure to the west. Both structural types, due to their light weight, flexibility and inherent resilience have performed well during the Canterbury Earthquakes.

3.4 Building Foundation System and Soil Conditions

Soil in this area is categorised as technical category 2 (TC2) yellow meaning that it may be susceptible to liquefaction and associated settlement and may require specific design for foundations.

3.5 Available Structural Documentation and Inspection Priorities

The original building drawings were not available for the library however an overall review of building configuration carried out on site informed the inspection process and was deemed adequate for this relatively simple structure.

3.6 Available Survey Information

A level survey has been completed.

4. Structural Investigation

4.1 Summary of Building Damage

The Redwood Library is currently in use and was occupied at the time the damage assessment was carried out. The library manager and play centre manager were available and were helpful in providing access and assisting with the inspection of critical structural elements.

The exposed steel structure in the library allowed visual inspection without any intrusive investigation. Relatively minor cracks were identified in the joints between wall linings and the steel columns. The floors of the library were covered with carpet; however no evidence of distortion in the library floor was noted.

The structural members in the play centre were also covered by linings. The inspection of the linings covering the walls and ceilings showed little evidence of damage. At the west end of the Early Childhood Centre there is evidence of minor internal slab hogging. There is also evidence of ground movement on the exterior playground. The centre manager noted that play-ground coverings had been replaced due to the extent of the ground movement in that area.

4.2 Record of Intrusive Investigation

Due to the minor nature of observed damage and the generic nature of hidden structural elements it was deemed unnecessary to carry out intrusive investigations in Redwood Library or the Early Childhood Centre.

4.3 Damage Discussion

Very little significant damage was observed in the Redwood Library. In the Early Childhood Centre slight hogging to a small area of internal floor slab was noted. A levels survey was done to investigate local movement in this area and to survey for possible evidence of other local movement or any possible global level differences. The level survey showed that level variation was within acceptable limits.

5. Building Review Summary

5.1 Building Review Statement

As noted above no intrusive investigations were carried out in Redwood Library. In the library area steel framed primary structure is partially exposed. Elsewhere destructive intrusive investigations were deemed unnecessary due to the likely hood of causing more damage than could be discovered by this means.

5.2 Critical Structural Weaknesses

No critical structural weaknesses were found in Redwood Library.

6. Building Strength Assessment (Refer to Appendix C for background information)

6.1 General

The Redwood Library and the connected Early Child Hood Centre as discussed above are of a type of building that are resilient, have ductile failure mechanisms and have typically performed well during the Canterbury Earthquakes. As noted above, observed damage was of a minor nature apart from possible local slab hogging in the nursery area at the western end of the Early Childhood Centre.

6.2 Initial %NBS Assessment

Although the Redwood Library has likely been subject to specific engineering design the subsequent addition of the Early Child Hood Centre affects the overall performance of the structure and means that the IEP process does not give a useful estimate of building capacity in terms of percentage of new building strength.

An estimate of building strength can be made by assigning assessed material capacities to the existing walls, calculating capacity and comparing this to codified demand. This analysis has been carried out for the structure as a whole and has resulted in an estimated percentage new building standard of 70%NBS. **This value is places the structure in the category of low earthquake risk**.

6.3 Results Discussion

As the existing lateral load capacity of the structure exceeds 67%NBS the building can be considered safe to occupy however minor slab damage has been noted in the Early Childhood Centre and a levels survey was carried out to determine the extent of any damage. The level survey results show no significant damage.

7. Conclusions and Recommendations

The land below the Redwood Library is zoned TC2 yellow and as such has been identified as potentially subject to liquefaction and settlement. Additionally there is a small amount of local evidence of settlement and liquefaction in the surrounding land. A levels survey was carried out within Redwood Library to determine the extent of any differential settlement. The differential settlement was found to be within acceptable limits.

The building is currently occupied, has been assessed as providing greater than 67%NBS and accordingly the Redwood Library **is considered suitable for continued occupation**.

8. Explanatory Statement

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

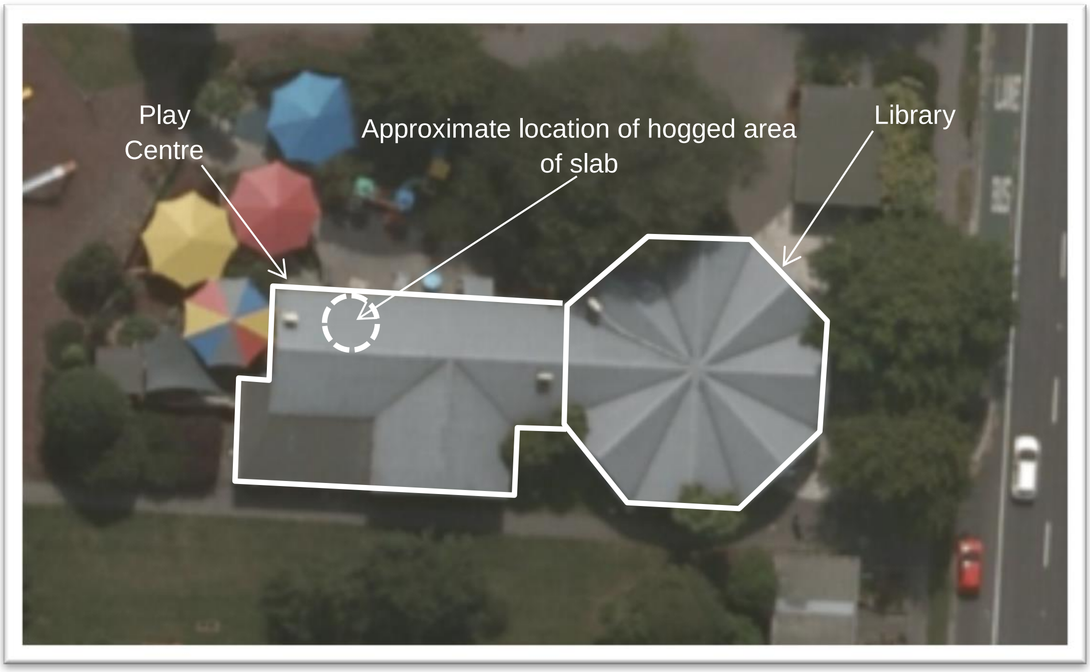
This review has been prepared by Aurecon at the request of its client and is exclusively for its client's use. It is not possible to make a proper assessment of this review without a clear understanding of the terms of engagement under which it has been prepared, including the scope of the instructions 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

Site photographes (13 February 2012)



Aerial Photo Taken Post February 22

Library East Elevation

Building North Elevation

South/East Elevation

Uneven Concrete slab outside entrance to library

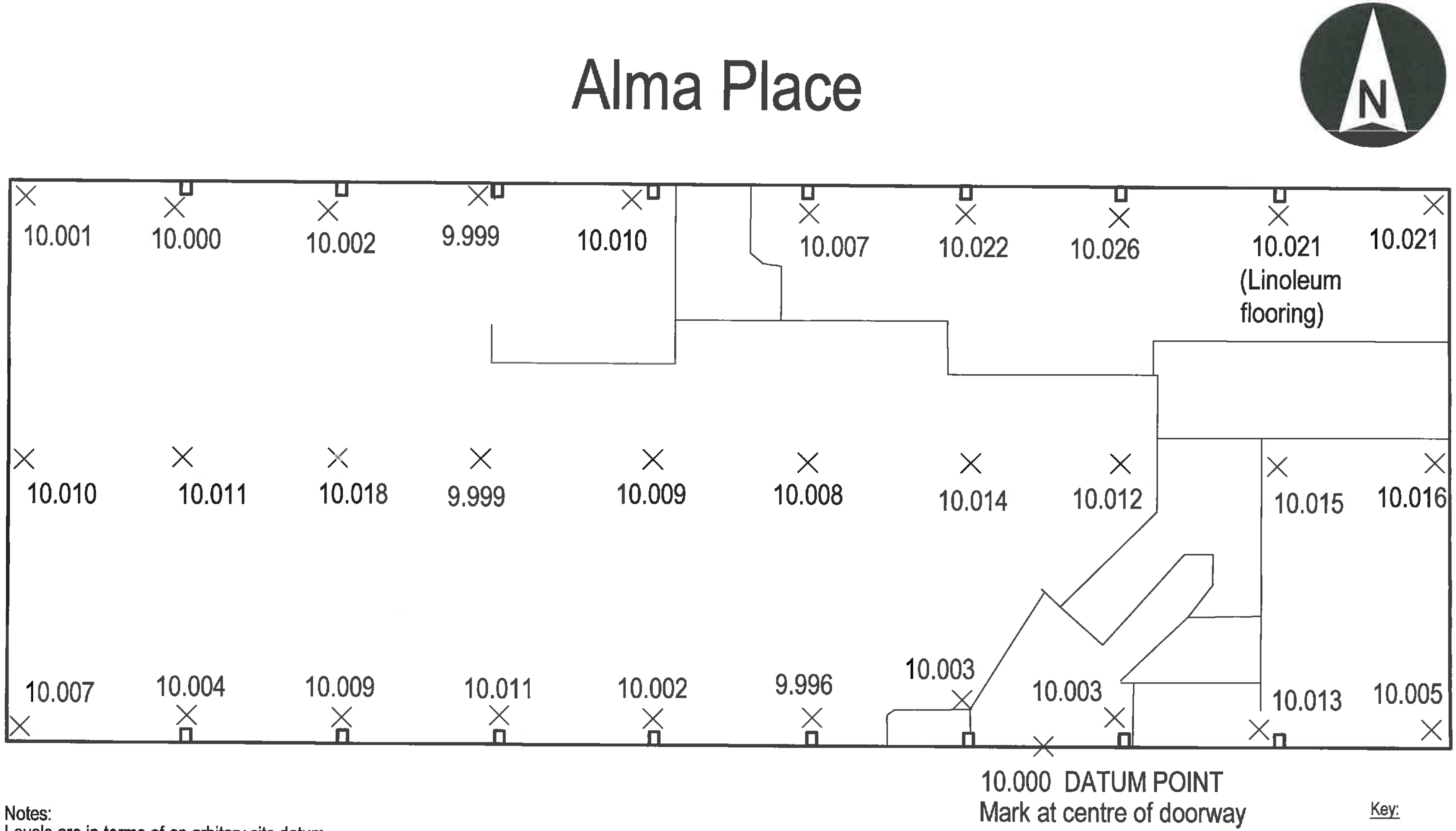
Cracking between window frame and steel column

Play Centre North elevation – Note drop in roof line where new section added (this is in line with the distortion in the floor of the play centre)

Nursery floor where distortion in lino is observed (appeared after earthquake)

High ceiling in play centre (no visible damage)

Alma Place



Notes:
Levels are in terms of an arbitary site datum
All levels were taken on carpet unless otherwise noted.
The linoleum flooring is 5mm lower than carpet heights.
Relative level accuracy ±2mm.
Date of Survey: 07/05/2012

Key:
Internal Walls
External Walls
Columns
Level location

aurecon
www.aurecongroup.com

CLIENT	REV	DATE	REVISION DETAILS	APPROVED	DRAWN	SURVEYED	PROJECT	NOT FOR CONSTRUCTION
CCC	A				TMurray	TMurray	Shirley Library Marshland Road	PROJECT No. 227255
					CHECKED RHope		TITLE Floor Level Survey	SCALE N.T.S. / SIZE A4
					APPROVED RHope	DATE		DRAWING No. SU.01 / REV A

Appendix B

Reference Documents and Material

- AS/NZS 1170.0,1,5 and commentaries;
- New Zealand Society for Earthquake Engineering (NZSEE) 2006 Study Group Recommendations "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes" – June 2006
- Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-Residential Buildings in Canterbury. Part 2 Evaluation Procedure. Draft prepared by Engineering Advisory Group, Revision 5, 19 July 2011.

Appendix C

Explanation of Strength Assessment

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 high risk or 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 Build Act). If the building strength exceeds 33%NBS but is less than 67%NBS the building is considered a moderate risk building. Above 67%NBS is considered low 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).

Earthquake Resistance Standards

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 3.1 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 3.1: NZSEE Risk Classifications Extracted from table 2.2 of the NZSEE 2006 AISPBE Guidelines

Table 3.1 below compares the percentage NBS to the relative risk of the building failing in a seismic event with a 10% risk 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% risk of exceedance** in the next year.

Table 3.1: %NBS compared to relative risk of failure

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

1 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.

2 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.

2.1 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

2.2 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.

2.2.1 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.

2.3 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.

2.4 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:

a. Hazard Factor increased from 0.22 to 0.3 (36% increase in the basic seismic design load)
b. 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:	Redwood Library			Reviewer:	Simon Manning
	Unit	No:	Street	CPEng No:	132053
Building Address:		339	Main Nortth Road	Company:	Aurecon
Legal Description:				Company project number:	227052
				Company phone number:	03 375 0761
	Degrees	Min	Sec		
GPS south:	43	28	38.75	Date of submission:	July2013
GPS east:	172	36	58.25	Inspection Date:	Feruary
				Revision:	2
Building Unique Identifier (CCC):	PRO 2179 002			Is there a full report with this summary?	yes

Site

Site slope:	flat	Max retaining height (m):	0
Soil type:	mixed	Soil Profile (if available):	
Site Class (to NZS1170.5):	D		
Proximity to waterway (m, if <100m):		If Ground improvement on site, describe:	
Proximity to clifftop (m, if < 100m):			
Proximity to cliff base (m,if <100m):		Approx site elevation (m):	11.00

Building

No. of storeys above ground:	1	single storey = 1	Ground floor elevation (Absolute) (m):	11.20
Ground floor split?	no		Ground floor elevation above ground (m):	11.00
Storeys below ground	0			
Foundation type:	mat slab		if Foundation type is other, describe:	
Building height (m):	5.00		height from ground to level of uppermost seismic mass (for IEP only) (m):	5
Floor footprint area (approx):	300			
Age of Building (years):	40		Date of design:	1976-1992
Strengthening present?	no		If so, when (year)?	
			And what load level (%g)?	
Use (ground floor):	educational		Brief strengthening description:	
Use (upper floors):				
Use notes (if required):	Public Library			
Importance level (to NZS1170.5):	IL2			

Gravity Structure

Gravity System:	frame system		
Roof:	steel framed	rafter type, purlin type and cladding	Steel Rafters over Library Area. Elsewhere timber framed roof structure.
Floors:			
Beams:			
Columns:			
Walls:			

Lateral load resisting structure

Lateral system along:	other (note)	**Note: Define along and across in detailed report!**	describe system	Mixed System, Concrete Walls and Timber Framed Walls
Ductility assumed, μ:	3.00			
Period along:	0.40	0.00	estimate or calculation?	estimated
Total deflection (ULS) (mm):	35		estimate or calculation?	estimated
maximum interstorey deflection (ULS) (mm):	35		estimate or calculation?	estimated

Lateral system across:	other (note)		describe system	Mixed System, Concrete Walls and Steel Frames
Ductility assumed, μ:	3.00			
Period across:	0.40	0.00	estimate or calculation?	estimated
Total deflection (ULS) (mm):	35		estimate or calculation?	estimated
maximum interstorey deflection (ULS) (mm):	35		estimate or calculation?	estimated

Separations:

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

Non-structural elements

Stairs:			
Wall cladding:			
Roof Cladding:	Metal	describe	
Glazing:	aluminium frames		
Ceilings:	light tiles		
Services(list):			

Available documentation

Architectural	none	original designer name/date	
Structural	none	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:		Describe damage:	minor - none
Settlement:	0-25mm	notes (if applicable):	Nursary Area of Early Childhood Centre
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:		Describe how damage ratio arrived at:	
	Describe (summary):			
Across	Damage ratio:			
	Describe (summary):			
Diaphragms	Damage?:	no	Describe:	
CSWs:	Damage?:	no	Describe:	
Pounding:	Damage?:	no	Describe:	
Non-structural:	Damage?:	yes	Describe:	

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

Recommendations

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

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

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): 1976-1992

h_n from above: 5m

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	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:	
Z_{1992}, from NZS4203:1992	
Hazard scaling factor, **Factor B:**	#DIV/0!

2.4 Return Period Scaling Factor

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

2.5 Ductility Scaling Factor

	along	across
Assessed ductility (less than max in Table 3.2)	1.00	1.00
Ductility scaling factor: =1 from 1976 onwards; or =kμ, if pre-1976, fromTable 3.3:		
Ductiity Scaling Factor, **Factor D**:	1.00	1.00

2.6 Structural Performance Scaling Factor:

	along	across
Sp:	1.000	1.000
Structural Performance Scaling Factor **Factor E**:	1	1

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

	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

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

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

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

3.5. Site Characteristics 1

3.6. Other factors, Factor F

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

Detail Critical Structural Weaknesses: (refer to DEE Procedure section 6)

List any: Refer also section 6.3.1 of DEE for discussion of F factor modification for other critical structural weaknesses

	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!**

Aurecon New Zealand Limited
Level 2, 518 Colombo Street
Christchurch 8011
PO Box 1061
Christchurch 8140
New Zealand

T +64 3 366 0821
F +64 3 379 6955
E christchurch@aurecongroup.com
W aurecongroup.com