aurecon

Templeton Community Centre
Qualitative Engineering Evaluation

Reference: 228611
Prepared for:
Christchurch City Council

Functional Location ID: PRO 1661 001

Address: 62 Kirk Road, Templeton

Revision: 2
Date: 9 April 2014

Leading. Vibrant. Global.
www.aurecongroup.com

Document Control Record

Document prepared by:

Aurecon New Zealand Limited
Unit 2, 518 Colombo Street
Christchurch 8011
New Zealand

T +64 3 371 1993
F +64 3 379 6955
E christchurch@aurecongroup.com
W aurecongroup.com

Document control							aurecon
Report Title		Qualitative Engineering Evaluation					
Functional Location ID		**PRO 1661 001**	**Project Number**		228611		
File Path		P:\ 228611 - Templeton Community Centre.docx					
Client		Christchurch City Council	**Client Contact**		Michael Sheffield		
Rev	**Date**	**Revision Details/Status**	**Prepared**	**Author**	**Verifier**	**Approver**	
1	**2 July 2012**	Draft	C. Bong	C. Bong	L. Howard	L. Howard	
2	**9 April 2014**	Final	L. Castillo	L. Castillo	L. Howard	L. Howard	
Current Revision		**2**					

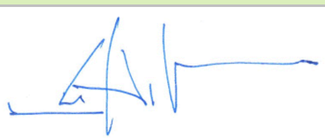
Approval			
Author Signature		Approver Signature	
Name	Luis Castillo	Name	Lee Howard
Title	Senior Structural Engineer	Title	Senior Structural Engineer

Contents

Appendices

Executive Summary

This is a summary of the Qualitative Engineering Evaluation for the Templeton Community Centre 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**	Templeton Community Centre			
Building Location ID	PRO 1661 001			**Multiple Building Site**	N
Building Address	62 Kirk Road, Templeton			**No. of residential units**	0
Soil Technical Category	N/A	**Importance Level**	3	**Approx. Year Built**	2002
Approx. Footprint (m²)	900	**Stories above ground**	1	**Stories below ground**	0
Type of Construction	Colour steel roof, steel purlins, glue laminated (glulam) portal frames, lined timber framed walls with a fibre cement sheet exterior finish, concrete slab on grade with local thickenings				
Qualitative L4 Report Results Summary					
Building Occupied	Y	The Templeton Community Centre is currently in use.			
Suitable for Continued Occupancy	Y	The Templeton Community Centre 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	Variations in floor levels were within acceptable limits.			
Building %NBS From Analysis	57%	Based on the Initial Evaluation Procedure (IEP). Corresponds to a "moderate risk" building according to the NZ Society of Seismic Engineering Guidelines.			
Qualitative L4 Report Recommendations					
Geotechnical Survey Required	N	Geotechnical survey not required due to lack of observed ground damage on site.			
Proceed to L5 Quantitative DEE	N	A quantitative DEE is not required for this structure.			
Approval					
Author Signature		**Approver Signature**			
Name	Luis Castillo	**Name**	Lee Howard		
Title	Senior Structural Engineer	**Title**	Senior Structural Engineer		

1 Introduction

1.1 General

On 10 May 2012 Aurecon engineers visited the Templeton Community Centre 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 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 Templeton Community Centre 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 Templeton Community Centre is a contemporary community centre building with a large hall and an attached foyer constructed in 2002. The building has a colour steel roof, steel purlins, glue laminated (glulam) portal frames and lined timber walls and a concrete floor founded on a slab on grade foundation with local thickenings for load bearing elements. The exterior of the building is clad in fibre cement sheet panels and corrugated metal.

The approximate area for the complex is 900 square metres. It is an Importance Level 3 Structure in accordance with NZS 1170 Part 0:2002 as the hall is capable of holding crowds in excess of 300 people.

2.2 Building Structural Systems Vertical and Horizontal

The Templeton Community Centre complex can be thought of in two parts.

- The main hall and the lean-to gallery; and
- The foyer, toilets, kitchen and meeting rooms at the Eastern end of the complex.

The gravity load resisting structure of the Templeton Community Centre consists of several system - glulam portal frames, lined timber framed walls and timber posts. The roof of the main hall and the attached lean to gallery in the Western side of the complex are supported by glulam portal frames and exterior lined timber framed walls. The veranda on the Northern side of the complex is supported on timber posts. The colour steel roof of the foyer area is supported on timber purlins that transfer loads into both the interior and exterior lined timber framed walls.

The lateral load resisting system consists of glulam portal frames and lined timber framed walls. For the Western portion of the complex, the seismic loads of the main hall and lean to gallery in the across direction are taken by glulam portal frames. The seismic loads in the along direction on the other hand, are resisted by the lined timber framed walls. The Eastern portion of the complex utilises lined timber framed walls to provide lateral capacity in both directions.

2.3 Reference Building Type

The Templeton Community Centre is a relatively new complex which comprises a large community hall with an attached foyer area. The complex is constructed from a combination of glulam portal frames and lined timber framed walls. Buildings of this nature are inherently lightweight, flexible and ductile as a result of the building materials and connection details used. Observed damage to the building stock in the Canterbury earthquake sequence has shown that buildings which are lightweight with inherently ductile construction have performed relatively well. Additionally, buildings of recent construction have fared well due to robust construction techniques and the greater compliance requirements of the modern building code.

2.4 Building Foundation System and Soil Conditions

The Templeton Community Centre has a concrete slab on grade foundation with local thickenings for load bearing elements.

The community centre is located on non-residential land and therefore has not been included in the Department of Building and Housing's Technical Classes Classifications. It is of note however, that the residential properties surrounding the community centre were classified as “Technical Category 1”.

2.5 Available Structural Documentation and Inspection Priorities

Only the architectural drawings were available for the Templeton Community Centre at the time of writing. The inspection priorities relate to a review of potential damage to the foundations and consideration of bracing adequacy.

2.6 Available Survey Information

A floor level survey was undertaken to establish the level of unevenness across the floors. The results of the survey are presented on the attached sketch in Appendix A. All of the levels were taken on top of the existing floor coverings which may have introduced some margin of error.

The Department of Building and Housing (DBH) published the “Revised Guidance on Repairing and Rebuilding Houses Affected by the Canterbury Earthquake Sequence” in November 2011, which recommends some form of re-levelling or rebuilding of the floor

1. If the slope is greater than 0.5% for any two points more than 2m apart, or
2. If the variation in level over the floor plan is greater than 50mm, or
3. If there is significant cracking of the floor.

It is important to note that these figures are recommendations and are only applicable to residential buildings. However, they provide useful guidance in determining acceptable floor level variations. The floor levels for the Templeton Community Centre were found to be within these recommended tolerances.

3 Structural Investigation

3.1 Summary of Building Damage

The Templeton Community Centre complex was operational at the time of the damage assessment. No visible damage was noted in the thorough non-intrusive damage assessment of the interior and exterior of the complex.

3.2 Record of Intrusive Investigation

No damage was noted and therefore, an intrusive investigation was neither warranted nor undertaken for Templeton Community Centre.

3.3 Damage Discussion

There were no signs of damage to the complex associated with the Canterbury earthquake sequence noted in the damage assessment. This can be attributed to:

1. The lightweight and ductile construction which have low seismic demands on the lateral load resisting structure;
2. The robustness of modern construction techniques and detailing; and
3. Lack of ground damage (i.e. liquefaction) in the area.

4 Building Review Summary

4.1 Building Review Statement

As previously noted, there have been no intrusive investigations undertaken on the Templeton Community Centre. The findings and recommendations of this report have been based on the architectural drawings and the damage assessment that was undertaken. Accordingly, it is assumed that the building has been constructed in accordance with the architectural drawings provided to Aurecon without significant amendments or alterations.

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 Templeton Community Centre complex is constructed from a combination of glulam portal frames and lined timber framed walls. Buildings of this nature generally have a ductile failure mode. As noted in the damage assessment above, the complex has fared well due to robust construction techniques and the compliance requirements of the modern building code.

5.2 Initial %NBS Assessment

The Templeton Community Centre has been subject to specific engineering design and the initial evaluation procedure (IEP) will give a useful indication of compliance to new building standard (%NBS). The selected assessment seismic parameters are tabulated in the Table 1 on the following page.

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 50 year design life
Ductility Factor in the Along Direction, μ	2.00	Lined timber framed walls
Ductility Factor in the Across Direction, μ	1.25	Glulam portal frames

The IEP has shown that the building is capable of achieving approximately 57%NBS. This corresponds to a “moderate risk” building in accordance with the New Zealand Society for Earthquake Engineering (NZSEE) guidelines.

5.3 Results Discussion

The results of the Initial Evaluation Procedure (IEP) correspond well with the level of damage observed in the visual damage assessment. This is expected of the structure due to

1. The lightweight and ductile construction which have low seismic demands on the lateral load resisting structure;
2. The robustness of modern construction techniques and detailing; and
3. Lack of ground damage (i.e. liquefaction) in the area.

Overall, the complex has demonstrated good seismic performance.

6 Conclusions and Recommendations

The levels survey has shown no differential settlement in the foundations of the Templeton Community Centre, and as such, **a geotechnical investigation is currently not considered necessary**.

There has been no damage noted to the Templeton Community Centre, and as such, it is our opinion that the community centre **is 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 from the Christchurch City Council records. We have assumed that the building has been constructed in accordance with the drawings.

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

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

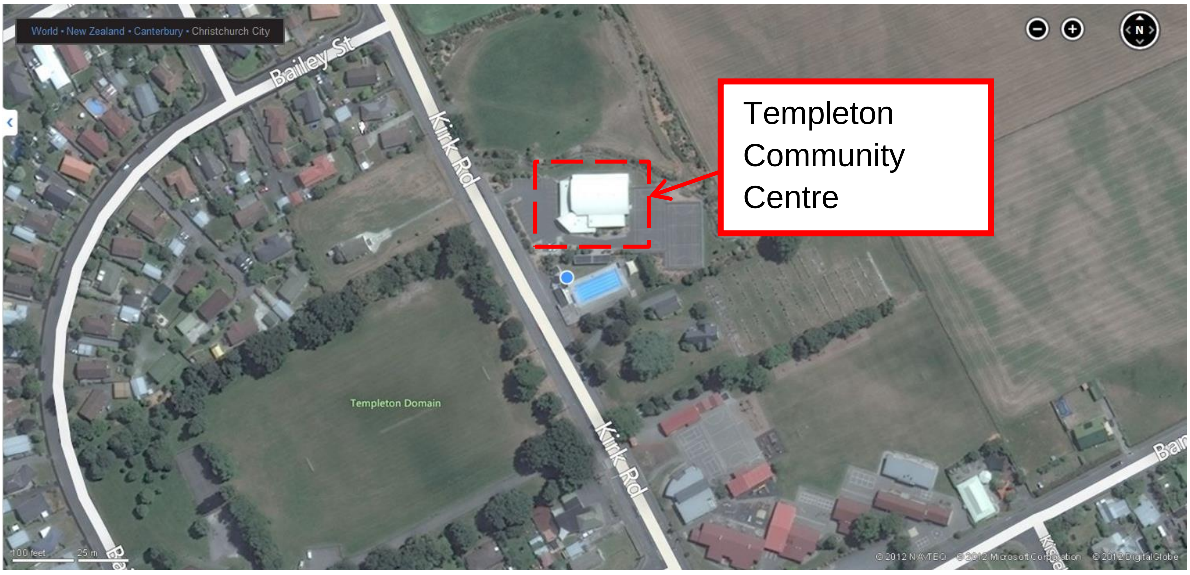
Without limiting any of the above, Aurecon's liability, whether under the law of contract, tort, statute, equity or otherwise, is limited as set out in the terms of the engagement with the client.

Appendices

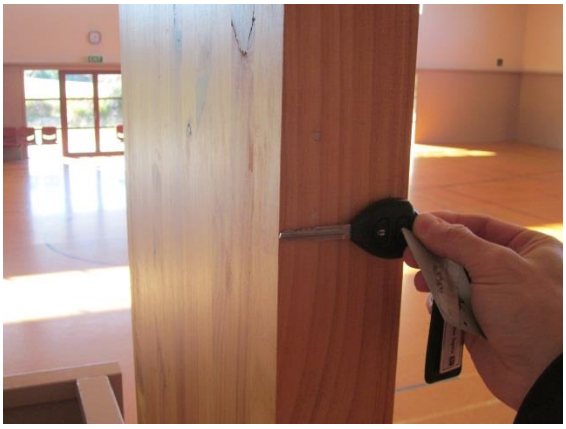
Appendix A

Site Map, Photos and Levels Survey Results

10 May 2012 – Templeton Community Centre Site Photographs



Western elevation of the Templeton Community Centre.	
South Eastern elevation of the Templeton Community Centre	

Northern Eastern elevation of the veranda.	
Interior view of the foyer.	
Interior view of the main hall.	
Close up of the glulam portal frame legs.	

Close up of the glulam portal frame knee joint.	
Interior view of the lean to gallery adjacent to the main hall.	
Interior view of the kitchen area.	

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 3606, 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).

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

Compliance

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

Canterbury Earthquake Recovery Authority (CERA)

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

Section 38 – Works

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

Section 51 – Requiring Structural Survey

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

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

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

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

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

Building Act

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

Section 112 – Alterations

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

Section 115 – Change of Use

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

Section 121 – Dangerous Buildings

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

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

Section 122 – Earthquake Prone Buildings

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

Section 124 – Powers of Territorial Authorities

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

Section 131 – Earthquake Prone Building Policy

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

Christchurch City Council Policy

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

The 2010 amendment includes the following:

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

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

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

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

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

Building Code

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

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

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

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

Appendix E
Standard Reporting Spread Sheet

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Templeton Community Centre	Reviewer:	Lee Howard
	Unit No: Street	CPEng No:	1008889
Building Address:	62 Kirk Road	Company:	Aurecon
Legal Description:	Lot 1 DP 3258	Company project number:	228611
		Company phone number:	03 366 0821
	Degrees / Min / Sec		
GPS south:	43 / 32 / 57.85	Date of submission:	9/04/2014
GPS east:	172 / 28 / 16.90	Inspection Date:	10/05/2012
		Revision:	2
Building Unique Identifier (CCC):	PRO 1661 001	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):	40.40

Building

No. of storeys above ground:	1 (single storey = 1)	Ground floor elevation (Absolute) (m):	40.70
Ground floor split?	no	Ground floor elevation above ground (m):	0.30
Storeys below ground:	0		
Foundation type:	mat slab	if Foundation type is other, describe:	
Building height (m):	8.00	height from ground to level of uppermost seismic mass (for IEP only) (m):	8
Floor footprint area (approx):	900		
Age of Building (years):	10	Date of design:	1992-2004
Strengthening present?	no	If so, when (year)?	
		And what load level (%g)?	
		Brief strengthening description:	
Use (ground floor):	public		
Use (upper floors):			
Use notes (if required):	community hall		
Importance level (to NZS1170.5):	IL3		

Gravity Structure

Gravity System:	frame system		
Roof:	timber framed	rafter type, purlin type and cladding:	DHS purlins, colour steel roo
Floors:	concrete flat slab	slab thickness (mm):	100
Beams:	timber	type:	
Columns:	timber	typical dimensions (mm x mm):	
Walls:			

Lateral load resisting structure

Note: Define along and across in detailed report!

Lateral system along:	lightweight timber framed walls		N/A
Ductility assumed, μ:	2.00	note typical wall length (m):	
Period along:	0.40 (0.00)	estimate or calculation?	estimated
Total deflection (ULS) (mm):		estimate or calculation?	
maximum interstorey deflection (ULS) (mm):		estimate or calculation?	
Lateral system across:	timber moment frame		4
Ductility assumed, μ:	1.25	note typical bay length (m):	
Period across:	0.40 (0.00)	estimate or calculation?	estimated
Total deflection (ULS) (mm):		estimate or calculation?	
maximum interstorey deflection (ULS) (mm):		estimate or calculation?	

Separations:

leave blank if not relevant

north (mm):	
east (mm):	
south (mm):	
west (mm):	

Non-structural elements

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

Available documentation

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

Building:

Current Placard Status:	green		
Along — Damage ratio:	0%	Describe how damage ratio arrived at:	
Describe (summary):			
Across — Damage ratio:	0%		
Describe (summary):			
Diaphragms — Damage?:	no	Describe:	
CSWs — Damage?:	no	Describe:	
Pounding — Damage?:	no	Describe:	
Non-structural — Damage?:	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 e'quakes:	75% (75% %NBS from IEP below)	If IEP not used, please detail assessment methodology:	
Assessed %NBS after e'quakes:	75%		
Across — Assessed %NBS before e'quakes:	57% (57% %NBS from IEP below)		
Assessed %NBS after e'quakes:	57%		

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): 1992-2004

h_n from above: 8m

Seismic Zone, if designed between 1965 and 1992:

not required for this age of building

Design Soil type from NZS4203:1992, cl 4.6.2.2:

	along	across
Period (from above):	0.4	0.4
(%NBS)nom from Fig 3.3:	22.0%	22.0%
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	1.0	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
Final $(\%NBS)_{nom}$:	**22%**	**22%**

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		0.8
	Hazard scaling factor, **Factor B**:		2.666666667
2.4 Return Period Scaling Factor	Building Importance level (from above):		3
	Return Period Scaling factor from Table 3.1, **Factor C**:		0.90
		along	across
2.5 Ductility Scaling Factor	Assessed ductility (less than max in Table 3.2)	2.00	1.25
	Ductility scaling factor: =1 from 1976 onwards; or =kμ, if pre-1976, fromTable 3.3:	1.57	1.14
	Ductiity Scaling Factor, **Factor D**:	1.00	1.00
2.6 Structural Performance Scaling Factor:	Sp:	0.700	0.925
	Structural Performance Scaling Factor **Factor E**:	1.428571429	1.081081081
2.7 Baseline %NBS, $(NBS\%)_b = (\%NBS)_{nom} \times A \times B \times C \times D \times E$	**$\%NBS_b$**:	**75%**	**57%**

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

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

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

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

		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)		**1.00**	**1.00**
4.3 PAR x (%NBS)b:	PAR x Baselline %NBS:	**75%**	**57%**
4.4 Percentage New Building Standard (%NBS), (before)			**57%**

Aurecon New Zealand Limited
Unit 2, 518 Colombo Street
Christchurch 8011
New Zealand

T +64 3 371 1993
F +64 3 379 6955
E christchurch@aurecongroup.com
W aurecongroup.com