Little Akaloa Community Hall

BU 3590-001 EQ2

Detailed Engineering Evaluation

Quantitative Report

Christchurch City Council

Christchurch City Council

Little Akaloa Community Hall

Detailed Engineering Evaluation Quantitative Report

Prepared by Aaron Harrison
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Status: Final V2

Little Akaloa Community Hall Building
BU 3590-001 EQ2

Detailed Engineering Evaluation
Quantitative Report - SUMMARY
Final – Version Two

Little Akaloa, Banks Peninsula

Background
This is a summary of the Quantitative report for the Little Akaloa Community Hall building, and is based on the Detailed Engineering Evaluation Procedure document (draft) issued by the Structural Advisory Group on 19 July 2011, visual inspections on 18 January 2012, available drawings and calculations.

Key Damage Observed
No seismic damage was identified.

Critical Structural Weaknesses
The following potential critical structural weakness has been identified:

- Lack of subfloor bracing

Indicative Building Strength
Based on the information available, and from undertaking a quantitative assessment, the building's original capacity has been assessed to be less than 34% NBS along and across the building, as limited by the subfloor bracing. The building's post-earthquake capacity excluding critical structural weaknesses is in the order of 53% NBS along the building and 19% NBS across the building.

The building has been assessed to have a seismic capacity of less than 34% NBS and is therefore classed as earthquake prone.

Recommendations
It is recommended that:

a) A strengthening scheme be developed to increase the overall capacity of the building to at least 67% NBS.
b) It is recommended that the CCC review the on-going occupancy of this building.

Contents

1 Introduction

Opus International Consultants Limited has been engaged by Christchurch City Council (CCC) to undertake a detailed seismic assessment of the Little Akaloa Community Hall building, located at Little Akaloa, Banks Peninsula, following the M6.3 Christchurch earthquake on 22 February 2011.

The purpose of the assessment is to determine if the building is classed as being earthquake prone in accordance with the Building Act 2004.

The seismic assessment and reporting have been undertaken based on the qualitative and quantitative procedures detailed in the Detailed Engineering Evaluation Procedure (DEEP) document (draft) issued by the Structural Engineering Society (SESOC) on 19 July 2011.

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 to carry out a full structural survey before the building is re-occupied.

We understand that CERA 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). CERA have adopted the Detailed Engineering Evaluation Procedure (DEEP) document (draft) issued by the Structural Engineering Society (SESOC) on 19 July 2011. This document sets out a methodology for both initial qualitative and detailed quantitative assessments.

It is anticipated that a number of factors, including the following, will determine the extent of evaluation and strengthening level required:

1. The importance level and occupancy of the building.

2. The placard status and amount of damage.

3. The age and structural type of the building.

4. Consideration of any critical structural weaknesses.

Any building with a capacity of less than 34% of new building standard (including consideration of critical structural weaknesses) will need to be strengthened to a target of 67% as required by the CCC Earthquake Prone Building Policy.

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 the 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)) is satisfied that the building with a new use complies with the relevant sections of the Building Code ‘as near as is reasonably practicable’.

This is typically interpreted by CCC as being 67% of the strength of an equivalent new building. This is also the minimum level recommended by the New Zealand Society for Earthquake Engineering (NZSEE).

Section 121 – Dangerous Buildings

This section was extended by the Canterbury Earthquake (Building Act) Order 2010, and defines a building as dangerous if:

1. 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
2. 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
3. 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
4. There is a risk that other property could collapse or otherwise cause injury or death; or
5. 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 (EPB) 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 loads 33% of those 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 on 4 September 2010.

The 2010 amendment includes the following:

1. A process for identifying, categorising and prioritising Earthquake Prone Buildings, commencing on 1 July 2012;
2. A strengthening target level of 67% of a new building for buildings that are Earthquake Prone;
3. A timeframe of 15-30 years for Earthquake Prone Buildings to be strengthened; and,
4. 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.

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.

On 19 May 2011, Compliance Document B1: Structure was amended to include increased seismic design requirements for Canterbury as follows:

- 36% increase in the basic seismic design load for Christchurch (Z factor increased from 0.22 to 0.3);
- Increased serviceability requirements.

2.5 Institution of Professional Engineers New Zealand (IPENZ) Code of Ethics

One of the core ethical values of professional engineers in New Zealand is the protection of life and safeguarding of people. The IPENZ Code of Ethics requires that:

Members shall recognise the need to protect life and to safeguard people, and in their engineering activities shall act to address this need.

1.1 Giving Priority to the safety and well-being of the community and having regard to this principle in assessing obligations to clients, employers and colleagues.

1.2 Ensuring that responsible steps are taken to minimise the risk of loss of life, injury or suffering which may result from your engineering activities, either directly or indirectly.

All recommendations on building occupancy and access must be made with these fundamental obligations in mind.

3 Earthquake Resistance Standards

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 loadings are in accordance with the current earthquake loading standard NZS1170.5 [1].

A generally accepted classification of earthquake risk for existing buildings in terms of %NBS that has been proposed by the NZSEE 2006 [2] is presented in Figure 1 below.

Description	Grade	Risk	%NBS	Existing Building Structural Performance	Improvement of Structural Performance: Legal Requirement	Improvement of Structural Performance: 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 required under Act)	Unacceptable	Unacceptable

Figure 1: NZSEE Risk Classifications Extracted from Table 2.2 of the NZSEE 2006 AISPBE Guidelines

Table 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 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

3.1 Minimum and Recommended Standards

Based on governing policy and recent observations, Opus makes the following general recommendations:

3.1.1 Occupancy

– The Canterbury Earthquake Order[1] in Council 16 September 2010, modified the meaning of "dangerous building" to include buildings that were identified as being EPB's. As a result of this, we would expect such a building would be issued with a Section 124 notice, by the Territorial Authority, or CERA acting on their behalf, once

[1] This Order only applies to buildings within the Christchurch City, Selwyn District and Waimakariri District Councils authority

they are made aware of our assessment. Based on information received from CERA to date, this notice is likely to prohibit occupancy of the building (or parts thereof) until its seismic capacity is improved to the point that it is no longer considered an EPB.

3.1.2 Cordoning

- Where there is an overhead falling hazard, or potential collapse hazard of the building, the areas of concern should be cordoned off in accordance with current CERA/Christchurch City Council guidelines.

3.1.3 Strengthening

- Industry guidelines (NZSEE 2006 [2]) strongly recommend that every effort be made to achieve improvement to at least 67%NBS. A strengthening solution to anything less than 67%NBS would not provide an adequate reduction to the level of risk.

- It should be noted that full compliance with the current building code requires building strength of 100%NBS.

3.1.4 Our Ethical Obligation

- In accordance with the IPENZ code of ethics, we have a duty of care to the public. This obligation requires us to identify and inform CERA of potentially dangerous buildings; this would include earthquake prone buildings.

4 Building Description

4.1 General

The Little Akaloa Community Hall building is a single storey timber framed structure with timber weatherboard cladding and a lightweight corrugated iron roof. The building sits on concrete pile and timber pile foundations.

The building is situated on a section with a gradual slope and is located adjacent to two tennis courts and the Little Akaloa Clubrooms. The land slopes gradually from the hills in the south down to the road at the north of the section. The building is approximately 16m long in the east-west direction and 8.5m wide in the north-south direction. The building largely consists of two rooms, a hall and a kitchen. The walls are lined with particle board, the roof lined with hardboard and the flooring comprises of timber floor boards. The apex of the roof is approximately 5.5m above the ground and the building has a wall stud height of approximately 3m.

The building age is unknown, but is expected to have been built before 1940.

4.2 Gravity Load Resisting System

The roof is a timber framed roof clad in lightweight corrugated iron, with the raked ceiling lined with hardboard.

The walls are timber framed with a stud height of approximately 3m and a stud size of 100mm x 50mm.

The timber floor boards rest on a suspended timber framed subfloor system and this is in turn supported by tapered circular precast concrete piles under the main hall, square concrete piles under the kitchen extension and timber piles under the storage section.

4.3 Seismic Load Resisting System

Seismic loads in both principal directions are resisted by the shear walls braced with the particle board wall linings. The ceiling over the hall area is lined with painted hardboard and is assumed to provide a form of diaphragm action capable of distributing the lateral loads to the wall bracing elements.

There was no sign of subfloor bracing or hold down connections between the piles and bearers.

5 Survey

Copies of the following drawings were referred to as part of the assessment:

- One architectural sketch of the building completed by Opus Architecture titled "Little Akaloa Community Hall, Floor Plan and Typical Section".

No copies of the design calculations or structural drawings have been obtained for this building.

The drawings have been used to confirm the structural systems, investigate potential critical structural weaknesses (CSW) wherever possible and identify details which required particular attention.

6 Damage Assessment

The building does not appear to have suffered any damage as a result of the recent earthquake events.

7 General Observations

Overall the building has performed well under seismic conditions which would be expected for a timber framed single storey structure. The building has sustained little damage and continues to be fully operational.

Due to the non-intrusive nature of the original survey, many connection details could not be ascertained.

8 Detailed Seismic Assessment

8.1 Critical Structural Weaknesses

As outlined in the Critical Structural Weakness and Collapse Hazards draft briefing document, issued by the Structural Engineering Society (SESOC) on 7 May 2011, the term 'Critical Structural Weakness' (CSW) refers to a component of a building that could contribute to increased levels of damage or cause premature collapse of the building.

We have identified the following potential critical structural weakness in the building:

a) Lack of subfloor bracing - the building sits on concrete pile and timber pile foundations and there is no sign of subfloor bracing, such as cantilever piles, braced piles, anchor piles or perimeter foundation walls.

8.2 Seismic Coefficient Parameters

The seismic design parameters based on current design requirements from NZS1170.5:2004 and the NZBC clause B1 for this building are:

- Site soil class D, clause 3.1.3 NZS 1170.5:2004;
- Site hazard factor, Z=0.3, B1/VM1 clause 2.2.14B;
- Return period factor R_u = 1.0 from Table 3.5, NZS 1170.5:2004, for an Importance Level 2 structure with a 50 year design life;
- μ_{max} = 1.25 for the particle board wall linings.

8.3 Detailed Seismic Assessment Results

A summary of the structural performance of the building is shown in the following table. Note that the values given represent the worst performing elements in the building, as these effectively define the building's capacity. Other elements within the building may have significantly greater capacity when compared with the governing element.

Table 2: Summary of Seismic Performance

Structural Element/System	Failure mode and description of limiting criteria	Critical Structural Weakness and Collapse Hazard	% NBS based on calculated capacity
Walls in the east-west direction i.e. along the building	Bracing capacity of wall linings along the building	No	53%
Walls in the north-south direction i.e. across the building	Bracing capacity of wall linings across the building	No	19%
Ceiling diaphragm	Capacity of the ceiling lining/diaphragm	No	42%
Subfloor bracing	Bracing capacity of the subfloor structure	Yes	<34%

8.4 Discussion of Results

The building has a calculated capacity of less than 34% NBS as limited by lack of subfloor bracing in both directions and the capacity of the wall lining in the north-south direction.

It has been assumed that the hardboard ceiling lining acts as a diaphragm, however the capacity of this element is 42% NBS.

As the building has a capacity less than 34% NBS it is defined as earthquake prone in accordance with the Building Act 2004. We recommend that the CCC review the on-going occupancy of this building until such time that strengthening works have been undertaken.

8.5 Limitations and Assumptions in Results

Our analysis and assessment is based on an assessment of the building in its undamaged state. Therefore the current capacity of the building will be lower than that stated.

The results have been reported as a %NBS and the stated value is that obtained from our analysis and assessment. Despite the use of best national and international practice in this analysis and assessment, this value contains uncertainty due to the many assumptions and simplifications which are made during the assessment. These include:

- Simplifications made in the analysis, including boundary conditions such as foundation fixity;
- Assessments of material strengths based on limited drawings, specifications and site inspections;
- The normal variation in material properties which change from batch to batch;
- Approximations made in the assessment of the capacity of each element, especially when considering the post-yield behaviour.

9 Geotechnical Assessment

9.1 Regional Geology

The published geological map of the area, (Geology of the Christchurch Area 1:250,000, Forsyth, Barrell and Jongens, 2008) indicates the site is located on grey to brown alluvium, comprising of silty sub-angular gravel and sand forming alluvial fans.

9.2 Peak Ground Acceleration

Interpolation of United States Geological Survey (USGS) Shakemap: South Island of New Zealand (22 Feb, 2011) indicates that this location has likely experienced a Horizontal Peak Ground Acceleration (PGA) of approximately 0.05g to 0.15g during the 22nd February 2011 Earthquake. Estimated PGA's have been cross checked with Geonets' Modified Mercalli intensity scale observations.

9.3 Expected Ground Conditions

No relevant site investigation data is available from Environment Canterbury database in the vicinity of this building.

9.4 Site Observations

The building was inspected by Opus structural engineers on 18 January 2012. The following observations were made from site notes and photographs.

a) The building is located 200m west of the beach on gentle sloping land.

b) The majority of the building is founded on cylindrical concrete piles and appears to be tied to the timber bearers. The building extension located on the west elevation is founded on round timber piles. Both foundations appear to be in good condition.

c) A tennis court has been excavated into the slope and a cantilevered concrete wall 1.4m high was installed around the perimeter approximately 5m west of the building. This appears to be undamaged. Refer to Photo 10.

d) Google Earth images suggest that there may be a water run-off channel down the hill to the south of the building.

e) The concrete footpath surrounding the building slopes toward the road following the natural topography, with minimal cracking.

f) The footpath between the Community Centre and Clubrooms appears to have settled.

9.5 Conclusions and Discussion

The existing foundations appear to have performed satisfactorily in the recent seismic events. No liquefaction has been observed on site. The paved tennis courts and the surrounding cantilever block wall appear to be in good condition, indicating that no ground deformation has occurred. The pavement between the Community Hall and Club Rooms does not appear to have settled due to the earthquakes and is likely to have been constructed with a fall to aid surface water run-off. Based on site observations, no further geotechnical investigations are recommended.

10 Remedial Options

Any remedial options for increasing the seismic capacity above 67% NBS would need to address the bracing capacity of the wall linings, particularly in the north-south direction, the subfloor bracing and the adequacy of the ceiling diaphragm in the main hall area.

11 Conclusions

(a) The building has a seismic capacity of less than 34% NBS and is therefore classed as earthquake prone.

(b) The seismic capacity is limited by the lack of subfloor bracing and the respective capacities of the braced walls and the ceiling diaphragm in the main hall.

(c) Strengthening work is required to increase the overall building capacity to at least 67% NBS.

(d) The existing foundations have performed satisfactorily, and no further geotechnical testing is required.

(e) As the building is classed as an earthquake prone building we recommend that the CCC review on on-going occupancy of the building until such time that strengthening works have been undertaken.

12 Recommendations

(a) Strengthening options be developed for increasing the seismic capacity of the building to at least 67% NBS.

(b) It is recommended that the CCC review the on-going occupancy of this building.

13 Limitations

(a) This report is based on an inspection of the structure with a focus on the damage sustained from the 22 February 2011 Canterbury Earthquake and aftershocks only. Some non-structural damage is mentioned but this is not intended to be a comprehensive list of non-structural items.

(b) Our professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practicing in this field at the time.

(c) This report is prepared for the CCC to assist in the assessment of remedial works required for council buildings and facilities. It is not intended for any other party or purpose.

14 References

[1] NZS 1170.5: 2004, *Structural design actions, Part 5 Earthquake actions,* Standards New Zealand.

[2] NZSEE: 2006, *Assessment and improvement of the structural performance of buildings in earthquakes,* New Zealand Society for Earthquake Engineering.

[3] Engineering Advisory Group, *Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury, Part 2 Evaluation Procedure*, Draft Prepared by the Engineering Advisory Group, Revision 5, 19 July 2011.

Appendix A – Photographs

Photo 1: View of the north east corner of the building

Photo 2: The south perimeter wall

Photo 3: The exterior of the storage area and kitchen area at the north west end of the building

Photo 4: View of the subfloor under the storage area

Photo 5: View of a concrete pile under the kitchen area of the building

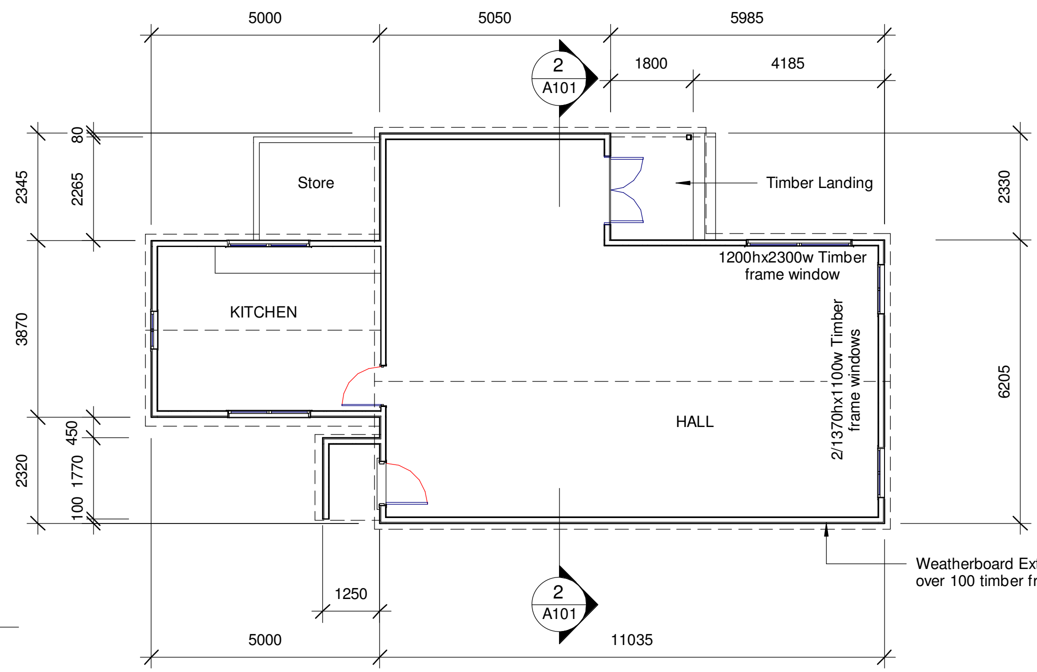
Photo 6: View of the subfloor under the main hall

Photo 7: View of the interior face of the south wall in the main hall

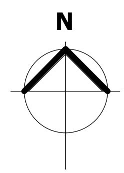
Photo 8: View to the west end of the main hall

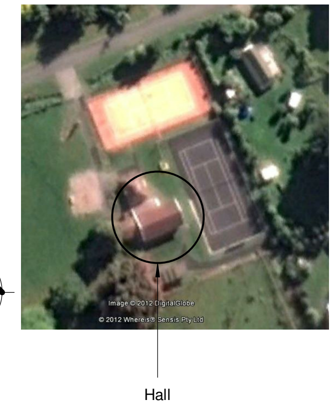
Photo 9: Concrete cantilevered wall on the east side of the hall

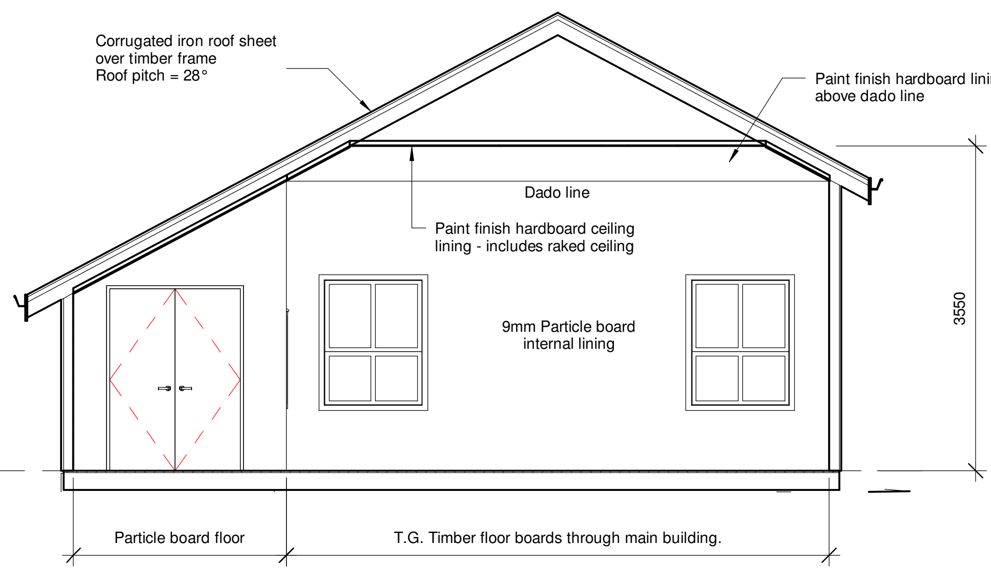
Appendix B – Floor Plan



1 A101 **Floor Plan**
1 : 100







2 A101 **Section 2**
1 : 50

Revision	Amendment	Approved	Revision Date

OPUS ARCHITECTURE

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Drawn	Designed	Approved	Revision Date
HF	HF	AH	30.03.12

Project No.	Scale
6-QUCCC.71	As indicated

Project
CHRISTCHURCH CITY COUNCIL

Little Akaloa Community Hall

Title
Floor Plan and Typical Section

Draft

Drawing No.	Sheet No.	Revision
	A101	RA

Appendix C – DEE Spreadsheet

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Little Akaloa Community Hall	Reviewer:	Alistair Boyce
	Unit / No: 584 / Street: Little Akaloa Road	CPEng No:	209860
Building Address:	584 Little Akaloa Road	Company:	Opus International Consultants
Legal Description:		Company project number:	6-QUCCC.00
		Company phone number:	3635400
GPS south:	Degrees 43, Min 40, Sec 32.00	Date of submission:	17/02/2014
GPS east:	Degrees 172, Min 59, Sec 22.00	Inspection Date:	20/01/2012
		Revision:	Final V2
Building Unique Identifier (CCC):	BU 3590-003 EQ2	Is there a full report with this summary?	yes

Site

Site slope:	slope < 1in 10	Max retaining height (m):	0
Soil type:	silty sand	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):	5.00

Building

No. of storeys above ground:	1	single storey = 1	Ground floor elevation (Absolute) (m): 5.00
Ground floor split?	no		Ground floor elevation above ground (m): 0.30
Storeys below ground	0		
Foundation type:	other (describe)		if Foundation type is other, describe: Cylindrical Concrete piles
Building height (m):	5.50		height from ground to level of uppermost seismic mass (for IEP only) (m):
Floor footprint area (approx):	100		
Age of Building (years):	80		Date of design: Pre 1935
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):			
Importance level (to NZS1170.5):	IL2		

Gravity Structure

Gravity System:	load bearing walls		
Roof:	timber framed	rafter type, purlin type and cladding	Corrugated iron cladding
Floors:	timber	joist depth and spacing (mm)	
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		note typical wall length (m)	1.5m - 11m
Ductility assumed, μ:	1.25			
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:	lightweight timber framed walls		note typical wall length (m)	
Ductility assumed, μ:	1.25			
Period across:	0.40	0.00	estimate or calculation?	
Total deflection (ULS) (mm):			estimate or calculation?	
maximum interstorey deflection (ULS) (mm):			estimate or calculation?	

Separations:

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

Non-structural elements

Stairs:			
Wall cladding:	other light	describe	Timber weatherboard
Roof Cladding:	Metal	describe	Corrugated iron
Glazing:	timber frames		
Ceilings:	plaster, fixed		
Services(list):			

Available documentation

Architectural	partial	original designer name/date	Sketch drawn from January 2012 site visit
Structural	none	original designer name/date	
Mechanical	none	original designer name/date	
Electrical	none	original designer name/date	
Geotech report	none	original designer name/date	

Damage

Site:
(refer DEE Table 4-2)

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

Building:

	Current Placard Status:	green		
Along	Damage ratio:	0%	Describe how damage ratio arrived at:	
	Describe (summary):			
Across	Damage ratio:	0%		
	Describe (summary):			
Diaphragms	Damage?:	no	Describe:	
CSWs:	Damage?:	yes	Describe:	Lack of subfloor bracing
Pounding:	Damage?:	no	Describe:	
Non-structural:	Damage?:	no	Describe:	

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

Recommendations

	Level of repair/strengthening required:	minor structural	Describe:	
	Building Consent required:	yes	Describe:	
	Interim occupancy recommendations:	do not occupy	Describe:	CCC to review occupancy
Along	Assessed %NBS before:	19% ##### %NBS from IEP below	If IEP not used, please detail assessment methodology:	Quantitative
	Assessed %NBS after:	19%		
Across	Assessed %NBS before:	19% ##### %NBS from IEP below		
	Assessed %NBS after:	19%		

OPUS