Pigeon Bay Community Hall
Detailed Engineering Evaluation
Quantitative Report

Christchurch City Council

Christchurch City Council

Pigeon Bay Community Hall

Detailed Engineering Evaluation Quantitative Report

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Status: Final

Pigeon Bay Community Hall Building
BU 3583-001 EQ2

Detailed Engineering Evaluation
Quantitative Report - SUMMARY
Version 1 - FINAL

Pigeon Bay, Banks Peninsula

Background

This is a summary of the Quantitative report for the Pigeon Bay 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 19 January 2012, available drawings and calculations.

Key Damage Observed

No seismic damage was identified.

Critical Structural Weaknesses

No potential critical structural weaknesses have been identified.

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 across the building, as limited by the wall bracing. The building's post-earthquake capacity is in the order of 35-50% NBS along the building (based on load redistribution between wall panels on the side walls) and 29% 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) The building should not be occupied until any strengthening works are carried out.
b) Strengthening options be developed for increasing the seismic capacity of the building to at least 34% NBS.

Contents

1 Introduction

Opus International Consultants Limited has been engaged by Christchurch City Council (CCC) to undertake a detailed seismic assessment of the Pigeon Bay Community Hall building, located at Pigeon Bay, 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 Pigeon Bay Community Hall building is a single storey timber framed structure with stucco cladding and a lightweight corrugated iron roof. The building sits on a concrete perimeter wall and square concrete piles. Refer to Appendix B for a floor plan of the building.

The building is situated on a section with a gradual slope down towards the bay. The building is approximately 36m long in the north-south direction and 17.6m wide in the east-west direction. The apex of the roof is approximately 7m from the ground with a stud height of approximately 4m in the main hall and 2.4m in the other rooms. The building consists of a main hall, two changing rooms at the north end, a stage, and a meeting hall and kitchen at the south end. The walls are lined with timber hardboard and tongue and groove timber boards. The floors are suspended timber floors with a timber sprung floor in the main hall originally from the Christchurch winter gardens.

The building has two chimneys located at the south end of the building, with one located at the western end of the meeting room and one on the south side of the kitchen. The chimneys are assumed to be constructed from brick with a stucco finish.

The building age is unknown, but the main hall is expected to have been built before 1960.

4.2 Gravity Load Resisting System

The roof is a timber trussed roof clad in lightweight corrugated iron, with exposed rafters in the main hall, a tongue and groove timber ceiling in the changing rooms and a hardboard lined ceiling in the kitchen.

The walls are timber framed with a stud height of approximately 4m in the main hall and 2.4m in the outer rooms.

The subfloor consists of tongue and groove timber floor boards on suspended timber framing sitting on square concrete piles, and a concrete foundation wall to the full perimeter of the building. The floor is a sprung floor under the main hall. The piles do not appear to be attached to the subfloor framing.

4.3 Seismic Load Resisting System

Seismic loads in both principal directions are resisted by the braced walls lined with plasterboard and tongue and groove wall linings. There is no ceiling over the hall area and there is no obvious diaphragm to distribute the lateral loads to the wall bracing elements.

The subfloor bracing capacity will be provided by the perimeter foundation wall. There was no sign of hold down connections between the piles and bearers.

5 Survey

The building currently has a green placard (not issued as part of this inspection).

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

- One architectural sketch of the building completed by Opus Architecture as part of this assessment, titled “Pigeon Bay Community Hall, Floor Plan & 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 not identified any critical structural weaknesses with this building.

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 timber frame with plasterboard wall linings and tongue and groove 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. across the building	Bracing capacity of wall bracing across the building	No	29%
Walls in the north-south direction i.e. along the building	Bracing capacity of wall bracing along the building	No	35-50%
Ceiling diaphragm	Capacity of the ceiling lining/diaphragm	No	<33%
Subfloor bracing	Bracing capacity of the subfloor structure	No	48%

8.4 Discussion of Results

The building has a calculated capacity of less than 34% NBS as limited by the wall bracing in the east-west direction.

In the north-south direction the capacity of the wall bracing is listed as 35-50% NBS. This has been derived by allowing for some load redistribution between the wall panels on the east and west side walls. It was shown from the analysis that one of the wall panels on these wall lines has a capacity less than 34% NBS, with the other walls closer to 50% NBS. We therefore deemed it appropriate to redistribute some of the load in order to justify a level of compliance greater than 33% NBS in this direction.

It is considered that failure of the diaphragm will result in increased levels of damage as the lateral load will not be able to be fully transferred to the in-plane walls.

As the building has an overall capacity less than 34% NBS it is defined as being earthquake prone in accordance with the Building Act 2004. It is recommended that the CCC review on-going occupancy of this building until strengthening works have been installed.

8.5 Limitations and Assumptions in Results

The observed level of damage suffered by the buildings was deemed low enough to not affect their capacity. Therefore the analysis and assessment of the buildings was based on them being in an undamaged state. There may have been damage to the buildings that was unable to be observed during assessments that could cause the capacity of the buildings to be reduced; therefore the current capacity of the buildings may 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 the border of grey to brown alluvium, comprising of silty sub-angular gravel and sand forming alluvial fans; and yellow-brown windblown silt on Banks Peninsula, greater than 3m thick and commonly in multiple layers.

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 0.10g to 0.20g 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 the 18th January 2012. The following observations were made from site notes and photographs.

- The platform for the building has been excavated into the sloping land. The building is situated approximately 30m south of the sea, with Wharf Road between Pigeon Bay Community Hall and the coastline.
- The building is founded on an external concrete perimeter strip footing and internal square concrete piles.
- A small stream is located 65m south west of the building.
- A swimming pool is located in an elevated position approximately 8m south of the building.
- There are no visible cracks on Wharf Road directly north of the building.
- A 10mm wide crack is located on the perimeter strip footing (unknown location on building). Refer to Photo 5 in Appendix A.
- Multiple cracks on the north-west corner of the building (assumed). One of these cracks propagates down into the perimeter strip footing. Refer to Photo 6 in Appendix A.
- Cracks are observed along the footpath and steps on the northern side of the building.

9.5 Conclusions and Discussion

The natural ground elevation changes by 6m over the length of the building. No evidence of differential settlement has been reported. The existing foundations appear to have performed satisfactorily in the recent seismic events. Cracking appears to be associated with shaking damage rather than ground performance. No liquefaction has been observed on the site. No site investigation data is available at this site. If the Christchurch City Council wishes to more accurately understand the liquefaction hazard at this location, site specific 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 walls, and the adequacy of the ceiling diaphragm in the main hall area. This could be done by replacing selected wall linings with new plywood bracing elements and installing hold down connections between piles and bearers.

11 Conclusions

(a) The building has a seismic capacity of less than 34% NBS and is therefore classed as earthquake prone in accordance with the Building Act 2004.

(b) The seismic capacity is limited by the capacity of the braced walls in the east-west direction and the lack of a ceiling diaphragm in the main hall.

(c) It is recommended that the CCC review the on-going occupancy of this building due to its earthquake prone building status.

(d) Strengthening work is required to increase the overall building capacity to at least 34% NBS.

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

12 Recommendations

(a) The building should not be occupied until any strengthening works are carried out.

(b) Strengthening options be developed for increasing the seismic capacity of the building to at least 34% NBS.

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 with assessing 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.

[4] Engineering Advisory Group, *Guidance on Detailed Engineering Evaluation of Non-residential buildings, Part 3 Technical Guidance*, Draft Prepared by the Engineering Advisory Group, 13 December 2011.

[5] SESOC, *Practice Note – Design of Conventional Structural Systems Following Canterbury Earthquakes*, Structural Engineering Society of New Zealand, 21 December 2011.

Appendix A – Photographs

Photo 1: View of the building from the north

Photo 2: View of the main hall, looking towards the stage.

Photo 3: View of one of the changing rooms

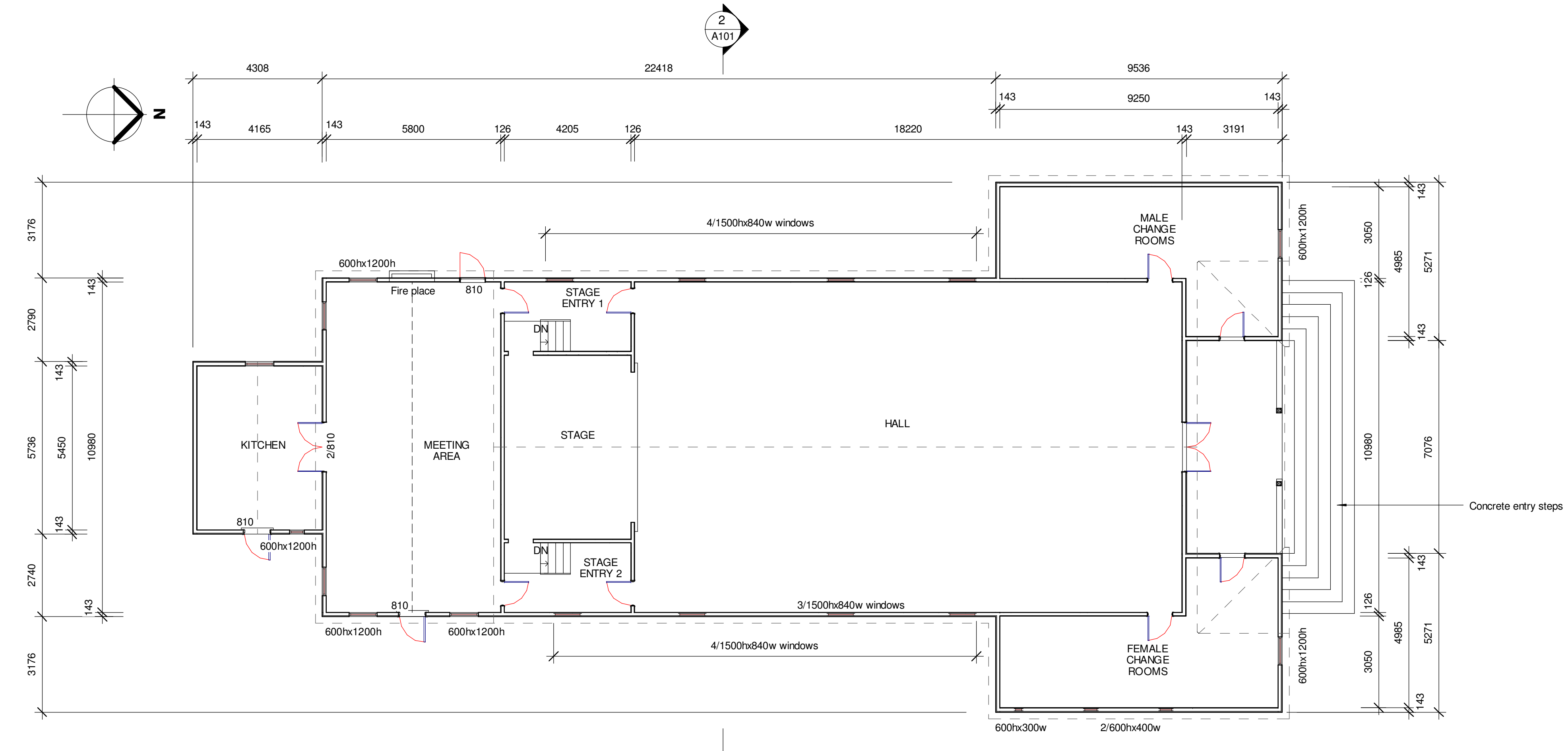
Photo 4: View of the kitchen

Photo 5: 10mm crack in the concrete perimeter strip footing.

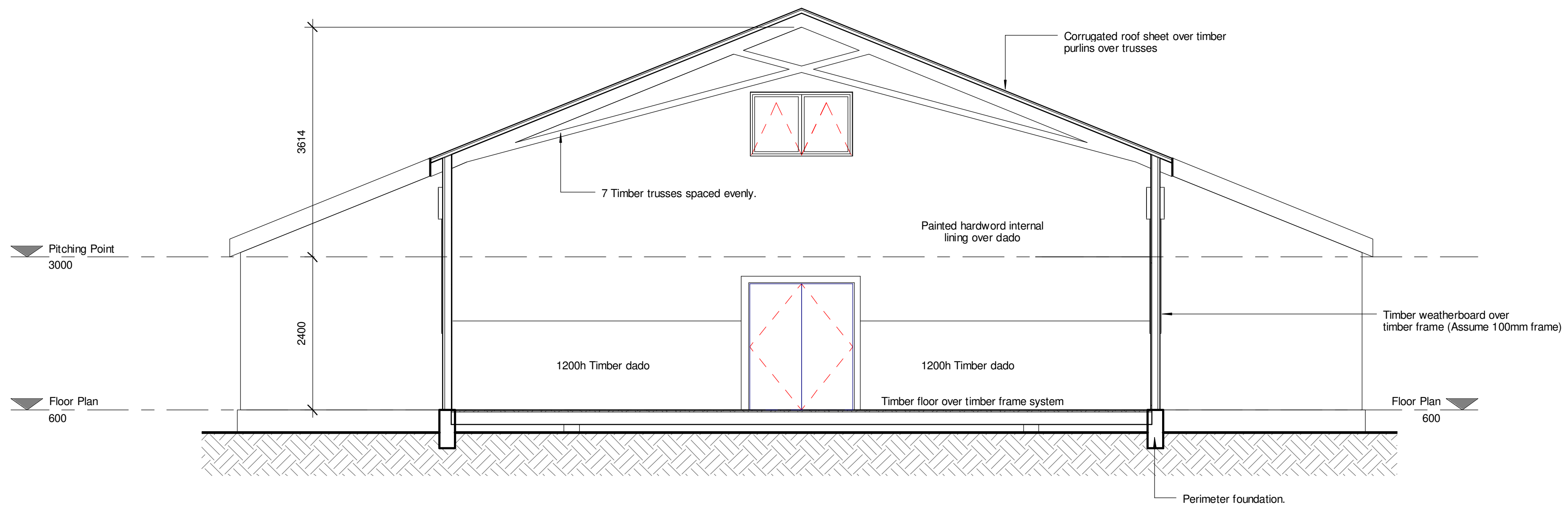
Photo 6: Multiple cracks on the north-west corner.

Photo 7: View of the subfloor and foundations

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			07.03.12

Project No.: 6-QCCC.76
Scale: As indicated

Project: CHRISTCHURCH CITY COUNCIL

PIGEON BAY COMMUNITY HALL

Title: FLOOR PLAN & TYPICAL SECTION

Draft

Drawing No.	Sheet No.	Revision
	A101	RA

Appendix C – DEE Spreadsheet

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Pigeon Bay Community Hall	Reviewer:	Alistair Boyce
	Unit / No: / Street	CPEng No:	209860
Building Address:		Company:	Opus International Consultants
Legal Description:		Company project number:	6-QUCCC.76
		Company phone number:	
	Degrees / Min / Sec		
GPS south:	43 / 41 / 12.30	Date of submission:	
GPS east:	172 / 53 / 55.70	Inspection Date:	19/01/2012
		Revision:	Final Version 1
Building Unique Identifier (CCC):		Is there a full report with this summary?	yes

Site

Site slope:	slope < 1in 10	Max retaining height (m):	0
Soil type:	mixed	Soil Profile (if available):	
Site Class (to NZS1170.5):	D		
Proximity to waterway (m, if <100m):	30	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):	0.50
Storeys below ground	0		
Foundation type:	other (describe)	if Foundation type is other, describe:	Square Concrete piles & Perimeter wall
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 - 9m
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:	plaster system	describe	Stucco
Roof Cladding:	Metal	describe	Corrugated iron
Glazing:	timber frames		
Ceilings:	none		
Services(list):			

Available documentation

Architectural	partial	original designer name/date	
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:		Describe how damage ratio arrived at:	
Describe (summary):			
Across — Damage ratio:	#DIV/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:	minor structural	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:	35%		
Across — Assessed %NBS before:	##### %NBS from IEP below		
Assessed %NBS after:	29%		

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):	Pre 1935	h_n from above:	m
Seismic Zone, if designed between 1965 and 1992:		not required for this age of building	
		not required for this age of building	

along across

	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**:	0.00	0.00

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

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

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

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

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		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

3.6. Other factors, Factor F

	Along	Across
For ≤ 3 storeys, max value =2.5, otherwise max value =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

3.7. Overall Performance Achievement ratio (PAR)	**0.00**	**0.00**
4.3 PAR x (%NBS)b: PAR x Baselline %NBS:	**#DIV/0!**	**#DIV/0!**
4.4 Percentage New Building Standard (%NBS), (before)		**#DIV/0!**

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