aurecon

Project: Avice Hill Arts & Crafts Centre Hall

Qualitative Engineering Evaluation

Prepared for: Christchurch City Council

Project: 227725

Date: 3 July 2013

Building Functional Location ID : PRO 0284 B001

Building Name : Avice Hill Arts & Crafts Centre Hall

Building Address : 395 Memorial Avenue

Document Control Record

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Current Revision		**2**				

Approval			
Author Signature		Approver Signature	
Name	Simon Manning	Name	Forrest Lanning
Title	Senior Structural Engineer	Title	Senior Structural Engineer

Contents

Executive Summary

This is a summary of the Qualitative Report for the Avice Hill Arts & Crafts Centre Hall building structure and is based on the Detailed Engineering Evaluation Procedure document issued by the Structural Advisory Group on 19 July 2011, visual inspections, available structural documentation and summary calculations as appropriate.

Building Details	Name	Avice Hill Main House		BuildLoc ID:	PRO 0284 B001
Building Address	395 Memorial Avenue				
Foot Print m^2	153	Stories above ground	1	Stories below ground	0
Approximate Year Built	1960's	Building Age Yrs	40-50	Number of res. units	0
Building Current Use	CCC property unit				
Type of Construction	Light timber frame residential building				

Qualitative L4 Report Results Summary		
Building Occupied	Y	Currently used by CCC property unit
Suitable for Continued Occupancy	Y	Assessed as suitable for continued occupation
Critical Structural Weaknesses	N	No critical weaknesses were found
Building %NBS From IEP	100%	Based on gypsum braced walls calculations
Key Damage Summary	Y	Refer to summary of building damage section 4.1 report body.

Qualitative L4 Report Recommendations		
Levels Survey Required	N	TC1 Land and no evidence of settlement
Geotechnical Survey Required	N	TC1 land and no evidence of settlement
Multiple Structure Site	Y	This report is for the main residential building
Proceed Directly To L5 Quantitative DEE	N	This report can be considered the **final report.**

Approval			
Author Signature		Approver Signature	
Name	Simon Manning	Name	Forrest Lanning
Title	Senior Structural Engineer	Title	Senior Structural Engineer

1. Introduction

1.1 General

On 13 January 2012 Aurecon engineers visited the Avice Hill Arts & Crafts Centre Hall to carry out a qualitative building damage assessment on behalf of Christchurch City Council. Detailed visual inspections were carried out to assess the damage caused by the earthquakes on 4 September 2010, 22 February 2011, 13 June 2011, 23 December and related aftershocks.

The scope of work included:

- Assessment of the nature and extent of the building damage.
- Visual assessment of the building strength particularly with respect to safety of occupants if the building is currently occupied.
- Assessment of requirements for detailed engineering evaluation including geotechnical investigation, level survey and any areas where linings and floor coverings need removal to expose structural damage.

This report outlines the results of our Qualitative Assessment of damage to the Avice Hill Arts & Crafts Centre Hall at 395 Memorial avenue 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 153 square meter main house at Advice Hill is the original building on the site. It is a light timber frame, single storey, building on concrete piles and perimeter concrete foundation. The building is considered to be an importance level 2 structure and is currently used by the Christchurch City Council Property Unit.

2.2 Building Structural Systems Vertical and Horizontal

Lateral loads are resisted by gypsum lined timber frame walls. Vertical gravity loads are carried by the timber frame walls that transfer the load into the concrete piles and perimeter foundation.

2.3 Reference Building Type

This is a typical residential lightweight timber frame house with a light corrugated iron roof and wooden weather board cladding. This is a type of building that is very common and typically performs well when correctly designed, proportioned and detailed as the building appears to be.

2.4 Building Foundation System and Soil Conditions

The house is supported on concrete piles and has a concrete perimeter foundation. The soil in this area is categorised as technical category 1 (TC1) meaning that future land damage from liquefaction is unlikely.

2.5 Available Structural Documentation and Inspection Priorities

Some original consent drawings and alteration consent drawings were available for the review was carried out. The main potential issue highlighted by the drawings was the lateral capacity of the bracing walls.

2.6 Available Survey Information

No levels or verticality survey information was available at the time of this report and it is not expected that any will be required as part of the DEE process.

3. Structural Investigation

3.1 Summary of Building Damage

The building is currently in use and was occupied at the time the damage assessment was carried out. Significant damage was not evident on inspection the following minor damage was noted;

- Minor damage to gypsum walls
- Small crack in perimeter concrete foundation

3.2 Record of Intrusive Investigation

Due to the lack of damage to the building when inspected an intrusive investigation was not required.

3.3 Damage Discussion

Very minor cracking to the gypsum board wall linings is not considered significant and will not greatly reduce the buildings capacity to resist lateral loads. Cracking is due to the movement of the timber frames during the earthquakes. The cracking in the concrete perimeter foundation is also not considered significant and in our opinion will not affect the buildings ability to carry loads.

4. Building Review Summary

4.1 Building Review Statement

The walls, ceiling and the concrete perimeter foundations were specifically reviewed on inspection. Due to the lack of significant damage noted the roof trusses and concrete piles have been inferred as adequate.

4.2 Critical Structural Weaknesses

No specific critical structural weaknesses were identified as part of the building qualitative assessment.

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

5.1 General

The Avice Hill main building is a symmetrical, single story, lightweight timber structure with simple and well defined load paths. This is a building type and configuration that can be resilient and appears to have performed well during the Canterbury Earthquakes to date. The building has a ductile failure mechanism laterally where loads are resisted by gypsum lined timber walls.

5.2 %NBS Assessment

The Avice Hill main building does not appear to be a structurally optimised structure. The %NBS was therefore estimated based on the capacity of the walls to resist earthquake load demands from NZS3604:2011.

The lateral load resisting structures of the buildings were identified as timber framing with Gypsum board. They were positioned in the majority of the external and internal walls of the structure. The %NBS was found to be 100% or above in both the transverse and longitudinal direction.

5.3 Results Discussion

Based on the %NBS this building falls into the low earthquake risk category. Due to the minor to negligible visible damage to the structure it is our opinion that this building acceptably meets the calculated 100%NBS. This aligned with the land category (TC1) in a similar event this building is expected to perform well.

6. Conclusions and Recommendations

The land below the Avice Hill is zoned TC1 and as such has been identified as on land that is unlikely to have future damage from liquefaction. Due to the acceptable %NBS (100% or more), that categorises the building as a low earthquake risk structure, no further strengthening or assessment is recommended.

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

7. Explanatory Statement

The inspections of the building discussed in this report have been undertaken to assess structural earthquake damage. No analysis has been undertaken to assess the strength of the building or to determine whether or not it complies with the relevant building codes, except to the extent that Aurecon expressly indicates otherwise in the report. Aurecon has not made any assessment of structural stability or building safety in connection with future aftershocks or earthquakes – which have the potential to damage the building and to jeopardise the safety of those either inside or adjacent to the building, except to the extent that Aurecon expressly indicates otherwise in the report.

This report is necessarily limited by the restricted ability to carry out inspections due to potential structural instabilities/safety considerations, and the time available to carry out such inspections. The report does not address defects that are not reasonably discoverable on visual inspection, including defects in inaccessible places and latent defects. Where site inspections were made, they were restricted to external inspections and, where practicable, limited internal visual inspections.

To carry out the structural review, existing building drawings were obtained (where available) from the Christchurch City Council records. We have assumed that the building has been constructed in accordance with the drawings.

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

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

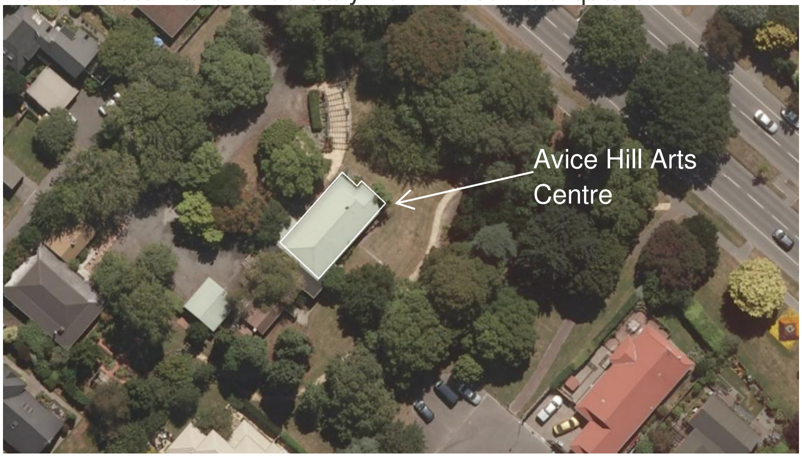
Without limiting any of the above, Aurecon's liability, whether under the law of contract, tort, statute, equity or otherwise, is limited as set out in the terms of the engagement with the client.

Appendices

Appendix A

Site Photos

Aerial Photo Taken February 2011 Post Earthquake



Site photographes (31 January 2012)

Front Elevation

Side Elevation

Minor cracking on perimeter concrete foundation

Gypsum lined walls

Appendix B

Reference Documents and Material

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

Appendix C

Explanation of Strength Assessment

New building standard (NBS)

New building standard (NBS) is the term used with reference to the earthquake standard that would apply to a new building of similar type and use if the building was designed to meet the latest design Codes of Practice. If the strength of a building is less than this level, then its strength is expressed as a percentage of NBS.

Earthquake prone buildings

A building can be considered to be high risk or earthquake prone if its strength is less than one third of the strength to which an equivalent new building would be designed, that is, less than 33%NBS (as defined by the New Zealand Build Act). If the building strength exceeds 33%NBS but is less than 67%NBS the building is considered a moderate risk building. Above 67%NBS is considered low risk.

Christchurch City Council Earthquake Prone Building Policy 2010

The Christchurch City Council (CCC) already had in place an Earthquake Prone Building Policy (EPB Policy) requiring all earthquake-prone buildings to be strengthened within a timeframe varying from 15 to 30 years. The level to which the buildings were required to be strengthened was 33%NBS.

As a result of the 4 September 2010 Canterbury earthquake the CCC raised the level that a building was required to be strengthened to from 33% to 67% NBS but qualified this as a target level and noted that the actual strengthening level for each building will be determined in conjunction with the owners on a building-by-building basis. Factors that will be taken into account by the Council in determining the strengthening level include the cost of strengthening, the use to which the building is put, the level of danger posed by the building, and the extent of damage and repair involved.

Irrespective of strengthening level, the threshold level that triggers a requirement to strengthen is 33%NBS.

As part of any building consent application fire and disabled access provisions will need to be assessed.

Christchurch Seismicity

The level of seismicity within the current New Zealand loading code (AS/NZS 1170) is related to the seismic zone factor. The zone factor varies depending on the location of the building within NZ. Prior to the 22nd February 2011 earthquake the zone factor for Christchurch was 0.22. Following the earthquake the seismic zone factor (level of seismicity) in the Christchurch and surrounding areas has been increased to 0.3. This is a 36% increase.

For this assessment, the building's earthquake resistance is compared with the current New Zealand Building Code requirements for a new building constructed on the site. This is expressed as a percentage of new building standard (%NBS). The new building standard load requirements have been determined in accordance with the current earthquake loading standard (NZS 1170.5:2004 Structural design actions - Earthquake actions - New Zealand).

Earthquake Resistance Standards

The likely capacity of this building has been derived in accordance with the New Zealand Society for Earthquake Engineering (NZSEE) guidelines 'Assessment and Improvement of the Structural Performance of Buildings in Earthquakes' (AISPBE), 2006. These guidelines provide an Initial Evaluation Procedure that assesses a buildings capacity based on a comparison of loading codes from when the building was designed and currently. It is a quick high-level procedure that can be used when undertaking a Qualitative analysis of a building. The guidelines also provide guidance on calculating a modified Ultimate Limit State capacity of the building which is much more accurate and can be used when undertaking a Quantitative analysis.

The New Zealand Society for Earthquake Engineering has proposed a way for classifying earthquake risk for existing buildings in terms of %NBS and this is shown in Figure 3.1 below.

Description	Grade	Risk	%NBS	Existing Building Structural Performance	Improvement of Structural Performance	
					Legal Requirement	NZSEE Recommendation
Low Risk Building	A or B	Low	Above 67	Acceptable (improvement may be desirable)	The Building Act sets no required level of structural improvement (unless change in use) This is for each TA to decide. Improvement is not limited to 34%NBS.	100%NBS desirable. Improvement should achieve at least 67%NBS
Moderate Risk Building	B or C	Moderate	34 to 66	Acceptable legally. Improvement recommended		Not recommended. Acceptable only in exceptional circumstances
High Risk Building	D or E	High	33 or lower	Unacceptable (Improvement	Unacceptable	Unacceptable

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

Table 3.1 below compares the percentage NBS to the relative risk of the building failing in a seismic event with a 10% risk of exceedance in 50 years **(i.e. 0.2% in the next year).** It is noted that the current seismic risk in Christchurch results in a **6% risk of exceedance** in the next year.

Table 3.1: %NBS compared to relative risk of failure

Percentage of New Building Standard (%NBS)	Relative Risk (Approximate)
>100	<1 time
80-100	1-2 times
67-80	2-5 times
33-67	5-10 times
20-33	10-25 times
<20	>25 times

Appendix D
Background and Legal Framework

1 Background

Aurecon has been engaged by the Christchurch City Council (CCC) to undertake a detailed engineering evaluation of the building

This report is a Qualitative Assessment of the building structure, and is based on the Detailed Engineering Evaluation Procedure document (draft) issued by the Structural Advisory Group on 19 July 2011.

A qualitative assessment involves inspections of the building and a desktop review of existing structural and geotechnical information, including existing drawings and calculations, if available.

The purpose of the assessment is to determine the likely building performance and damage patterns, to identify any potential critical structural weaknesses or collapse hazards, and to make an initial assessment of the likely building strength in terms of percentage of new building standard (%NBS).

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

2 Compliance

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

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

Section 38 – Works

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

Section 51 – Requiring Structural Survey

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

We understand that CERA will require a detailed engineering evaluation to be carried out for all buildings (other than those exempt from the Earthquake Prone Building definition in the Building

Act). It is anticipated that CERA will adopt the Detailed Engineering Evaluation Procedure document (draft) issued by the Structural Advisory Group on 19 July 2011. This document sets out a methodology for both qualitative and quantitative assessments.

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

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

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

2.2 Building Act

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

Section 112 – Alterations

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

Section 115 – Change of Use

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

2.2.1 Section 121 – Dangerous Buildings

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

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

Section 122 – Earthquake Prone Buildings

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

Section 124 – Powers of Territorial Authorities

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

Section 131 – Earthquake Prone Building Policy

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

2.3 Christchurch City Council Policy

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

The 2010 amendment includes the following:

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

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

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

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

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

2.4 Building Code

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

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

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

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

Appendix E

Standard Reporting Spreadsheet

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Avice Hill Arts and Crafts Centre Hall	Reviewer:	Simon Manning
	Unit / No: 395 / Street: Memorial Avenue	CPEng No:	132053
Building Address:		Company:	Aurecon
Legal Description:		Company project number:	227725
		Company phone number:	(03) 3660821
GPS south:	Degrees 43, Min 29, Sec 56.70	Date of submission:	3/07/2013
GPS east:	Degrees 172, Min 33, Sec 29.73	Inspection Date:	1/12/2011
		Revision:	2
Building Unique Identifier (CCC):	PRO 0284 B001	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):	23.00

Building

No. of storeys above ground:	1 (single storey = 1)	Ground floor elevation (Absolute) (m):	23.50
Ground floor split?	no	Ground floor elevation above ground (m):	0.50
Storeys below ground			
Foundation type:	other (describe)	if Foundation type is other, describe:	Concrete piles and perimeter foundation
Building height (m):	3.50	height from ground to level of uppermost seismic mass (for IEP only) (m):	3
Floor footprint area (approx):	153		
Age of Building (years):		Date of design:	
Strengthening present?	no	If so, when (year)?	
		And what load level (%g)?	
Use (ground floor):	commercial	Brief strengthening description:	
Use (upper floors):			
Use notes (if required):	CCC Buildings Unit		
Importance level (to NZS1170.5):	IL2		

Gravity Structure

Gravity System:	load bearing walls		
Roof:	other (note)	describe system	Timber Framed Light Roof
Floors:	other (note)	describe sytem	Suspended timber on piles
Beams:			
Columns:			
Walls:			

Lateral load resisting structure

Note: Define along and across in detailed report!

Lateral system along:	lightweight timber framed walls	note typical wall length (m)	3
Ductility assumed, μ:	3.00		
Period along:	0.40 (0.00)	estimate or calculation?	estimated
Total deflection (ULS) (mm):	30	estimate or calculation?	estimated
maximum interstorey deflection (ULS) (mm):	30	estimate or calculation?	estimated
Lateral system across:	lightweight timber framed walls	note typical wall length (m)	3
Ductility assumed, μ:	3.00		
Period across:	0.40 (0.00)	estimate or calculation?	estimated
Total deflection (ULS) (mm):	30	estimate or calculation?	estimated
maximum interstorey deflection (ULS) (mm):	30	estimate or calculation?	estimated

Separations: (leave blank if not relevant)

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

Non-structural elements

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

Available documentation

Architectural	full	original designer name/date	Christchurch City Council / 1964
Structural		original designer name/date	
Mechanical		original designer name/date	
Electrical		original designer name/date	
Geotech report		original designer name/date	

Damage

Site: (refer DEE Table 4-2)

Site performance:	Good	Describe damage:	
Settlement:	none observed	notes (if applicable):	
Differential settlement:	none observed	notes (if applicable):	
Liquefaction:	none apparent	notes (if applicable):	
Lateral Spread:	none apparent	notes (if applicable):	
Differential lateral spread:	none apparent	notes (if applicable):	
Ground cracks:	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?:	yes	Describe:	minor damage to GIB and perimeter foundation

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

Recommendations

Level of repair/strengthening required:	none	Describe:	
Building Consent required:	no	Describe:	
Interim occupancy recommendations:	full occupancy	Describe:	
Along — Assessed %NBS before:	100% (##### %NBS from IEP below)	If IEP not used, please detail assessment methodology:	Analysis of Capcity and Demand
Along — Assessed %NBS after:	100%		
Across — Assessed %NBS before:	100% (##### %NBS from IEP below)		
Across — Assessed %NBS after:	100%		

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): 0

h_n from above: 3m

Seismic Zone, if designed between 1965 and 1992:

not required for this age of building

not required for this age of building

	along	across
Period (from above):	0.4	0.4
(%NBS)nom from Fig 3.3:		

Note:1 for specifically design public buildings, to the code of the day: pre-1965 = 1.25; 1965-1976, Zone A =1.33; 1965-1976, Zone B = 1.2; all else 1.0

Note 2: for RC buildings designed between 1976-1984, use 1.2

Note 3: for buildngs designed prior to 1935 use 0.8, except in Wellington (1.0)

	along	across
Final $(\%NBS)_{nom}$:	**0%**	**0%**

2.2 Near Fault Scaling Factor

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

	along	across
Near Fault scaling factor (1/N(T,D), **Factor A**:	#DIV/0!	#DIV/0!

2.3 Hazard Scaling Factor

Hazard factor Z for site from AS1170.5, Table 3.3:

Z_{1992}, from NZS4203:1992

Hazard scaling factor, **Factor B**: #DIV/0!

2.4 Return Period Scaling Factor

Building Importance level (from above): 2

Return Period Scaling factor from Table 3.1, **Factor C**: 1.00

2.5 Ductility Scaling Factor

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

2.6 Structural Performance Scaling Factor:

Sp:		
Structural Performance Scaling Factor **Factor E**:	#DIV/0!	#DIV/0!

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

$\%NBS_b$: **#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

Height Difference effect D2, from Table to right

Therefore, Factor D: 0

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

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

3.5. Site Characteristics

3.6. Other factors, Factor F

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

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

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

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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