

*Christchurch City Council*

**Cedar Park  
Housing Complex  
PRO 2631**

**Detailed Engineering Evaluation  
Quantitative Assessment Report**





*Christchurch City Council*

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# Cedar Park Housing Complex

## Quantitative Assessment Report

**90 Bristol Street, St Albans**

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Date: February 2014  
Reference: 6-QC327.00  
Status: Final

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Release By

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# Summary

Cedar Park Housing Complex  
PRO 2631

Detailed Engineering Evaluation  
Quantitative Report - Summary  
Final

## Background

This is a summary of the quantitative report for the Cedar Park Housing Complex, and is based on the Detailed Engineering Evaluation Procedure document (draft) issued by the Structural Advisory Group on 19 July 2011. This assessment covers the 20 residential units and one separate garage on the site.

## Key Damage Observed

The residential units suffered minor damage to non-structural elements. This included cracking of interior wall and ceiling linings. Ground settlement has caused steps between external paving to develop which presents potential trip hazards. Structural damage to the residential units was generally minor and was limited to cracking of the concrete foundation slabs in Units 12, 13, 17, 19.

## Level Survey

All floor slopes assessed were less than the 5mm/m limitation set out in the MBIE guidelines [6].

## Internal Lining Nail Spacings

The internal lining nail spacings were measured on site to vary between 350-400mm.

## Critical Structural Weaknesses

No critical structural weaknesses were found in any of the buildings.

## Indicative Building Strength

**Table A: Summary of Seismic Performance by Blocks**

Block	NBS%	Floor Levels	Nail Spacings
PRO 2631 B001 (Block A)	73%	Pass	Pass
PRO 2631 B002 (Block B)	73%	Pass	Pass
PRO 2631 B003 (Block C)	73%	Pass	Pass
PRO 2631 B004 (Block D)	73%	Pass	Pass
PRO 2631 B005 (Block E)	73%	Pass	Pass
PRO 2631 B006 (Block F)	73%	Pass	Pass
PRO 2631 B007 (Block G)	100%	Pass	Pass
PRO 2631 B008 (Block H)	100%	Pass	Pass

PRO 2631 B009 (Block I)	100%	Pass	Pass
PRO 2631 B010 (Block J)	73%	Pass	Pass
PRO 2631 B011 (Block K)	100%	Pass	Pass
PRO 2631 B012 (Block L)	73%	Pass	Pass
PRO 2631 B013 (Block M)	81%	Pass	Pass
PRO 2631 B014 (Block N)	100%	Pass	Pass

No buildings on the site are considered to be earthquake prone.

Increasing the number of nails in the plasterboard will not significantly improve the strength of the buildings.

### Recommendations

It is recommended that;

- Veneer at height (gable ends) have the veneer ties checked.
- Repairs be undertaken to affected areas of exterior paving to remove trip hazards.
- A site specific geotechnical site investigation be carried out to determine the cause of cracking in the floor slabs.
- Cosmetic repairs be undertaken as required.

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# 1 Introduction

Opus International Consultants Limited has been engaged by Christchurch City Council to undertake a detailed seismic assessment of the Cedar Park Housing Complex, located at 90 Bristol Street, St Albans following the Canterbury earthquake sequence since September 2010. The site was visited by Opus International Consultants on 26 October 2013.

The purpose of the assessment is to determine if the buildings in the village are 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) [2] [3] [4] [5].

## 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.

Christchurch City Council requires any building with a capacity of less than 34% of New Building Standard (including consideration of critical structural weaknesses) to be strengthened to a target of 67% as required under 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).

The Earthquake Prone Building policy for the territorial authority shall apply as outlined in Section 2.3 of this report.

### **Section 115 – Change of Use**

This section requires that the territorial authority 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 territorial authorities as being 67% of the strength of an equivalent new building or as near as practicable. 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 October 2011 following the Darfield Earthquake on 4 September 2010.

The policy 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.

Where an application for a change of use of a building is made to Council, the building will be required to be strengthened to 67% of New Building Standard or as near as is reasonably practicable.



## 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:

- Increase in the basic seismic design load for the Canterbury earthquake region (Z factor increased to 0.3 equating to an increase of 36 – 47% depending on location within the region);
- 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	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 [2]

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).

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<sup>1</sup> 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 they are made aware of our assessment. Based on information received from CERA to date and from the MBIE guidance document dated December 2012 [6], 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/territorial authority 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.

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<sup>1</sup> This Order only applies to buildings within the Christchurch City, Selwyn District and Waimakariri District Councils authority.

## 4 Background Information

### 4.1 Building Descriptions

The site contains 20 residential units and one separate garage which were constructed in 2001. A site plan showing the location of the units, numbered 1 to 20, is shown in Figure 2. Figure 3 shows the location of the site in Christchurch City. The units are grouped together to form blocks of either one, two or five units.

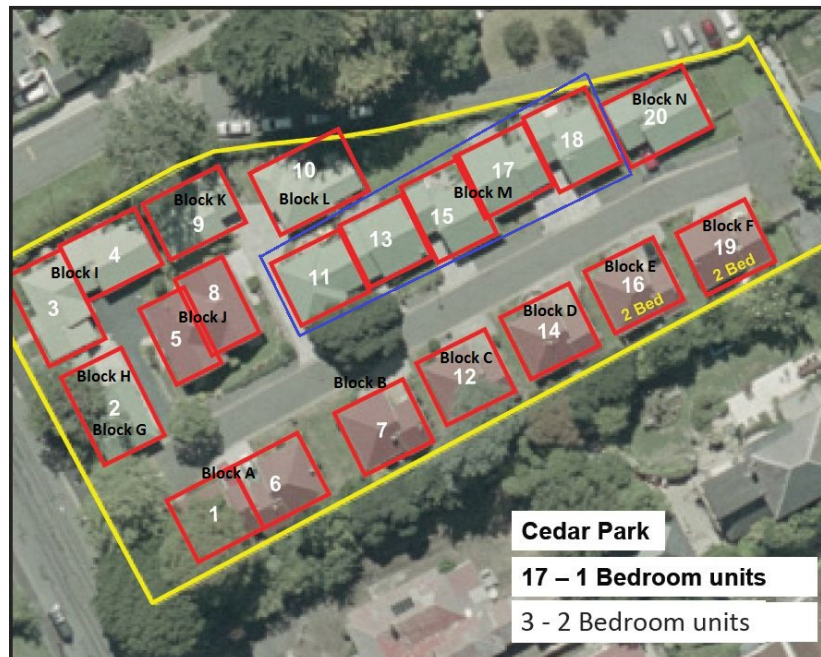


Figure 2: Site plan of Cedar Park Housing Complex.

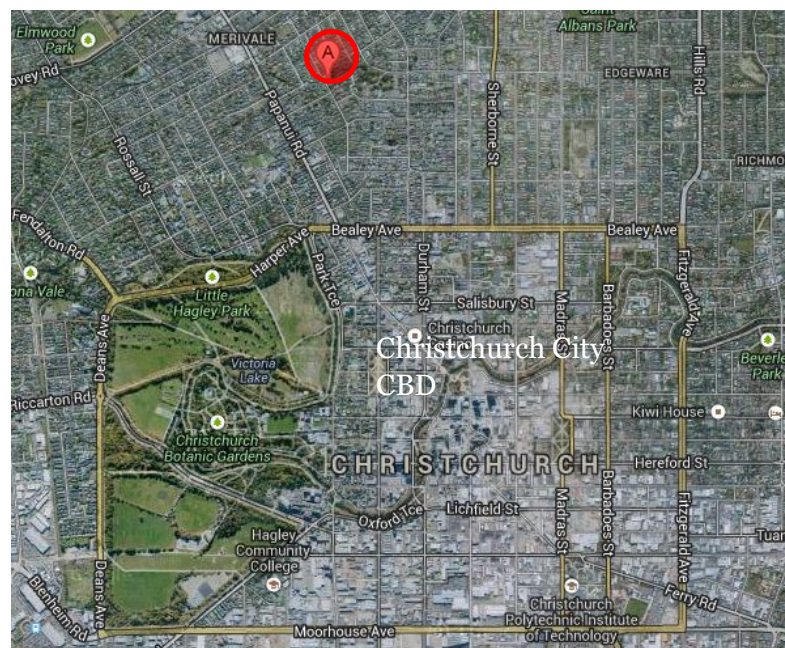


Figure 3: Location of Cedar Park (circled) relative to Christchurch City CBD (Source: Google Earth).



The residential units are timber-framed buildings with diagonal timber braces. The roof structure comprises of timber roof framing supporting light weight metal roofs (Decramastic tiles). The walls and ceilings are lined with plasterboard. External walls are clad with brick veneer. The foundations consist of a concrete slab on grade with perimeter strip footings. The units are separated by timber framed fire walls which have 2 layers of Gib Fyrelime both sides.

Figure 4-14 show floor plans taken from Christchurch City Council building consent documents, 1998. Figure 15 shows a typical cross section used in calculations.

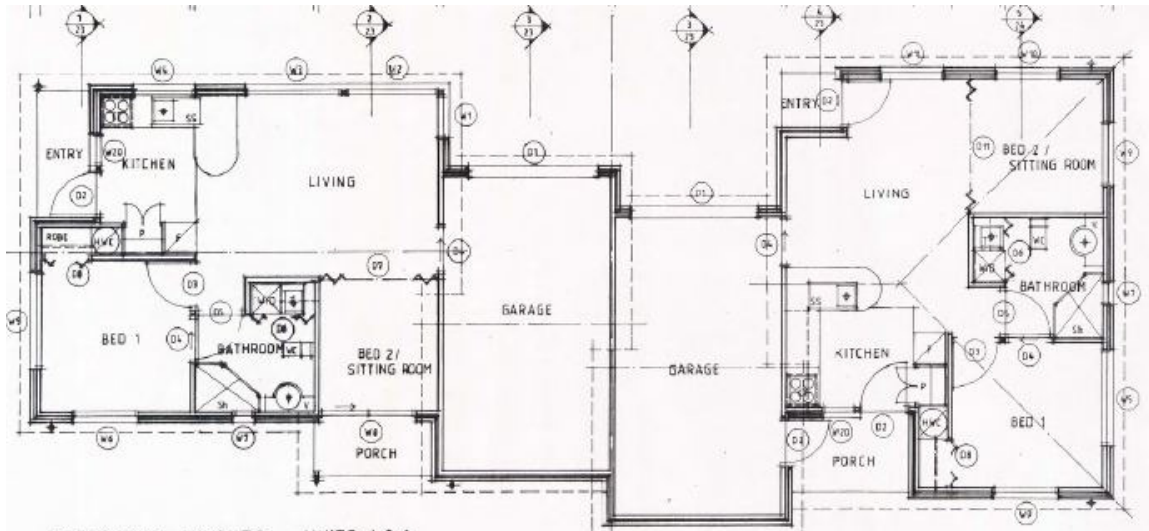


Figure 4: Floor Plan of Block A –of Units 1,6.

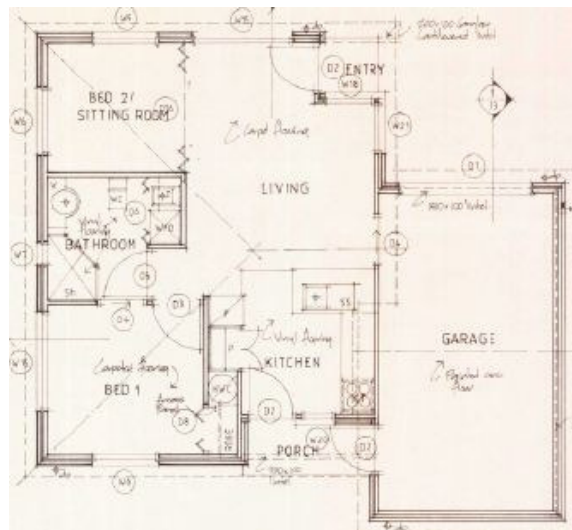


Figure 5: Floor Plan of Block B,C,D,E - Units 7,12,14,16.

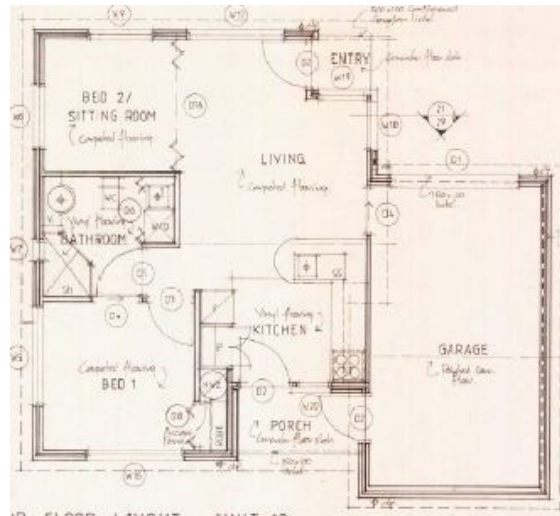


Figure 6: Floor Plan of Block F –of Unit 19.

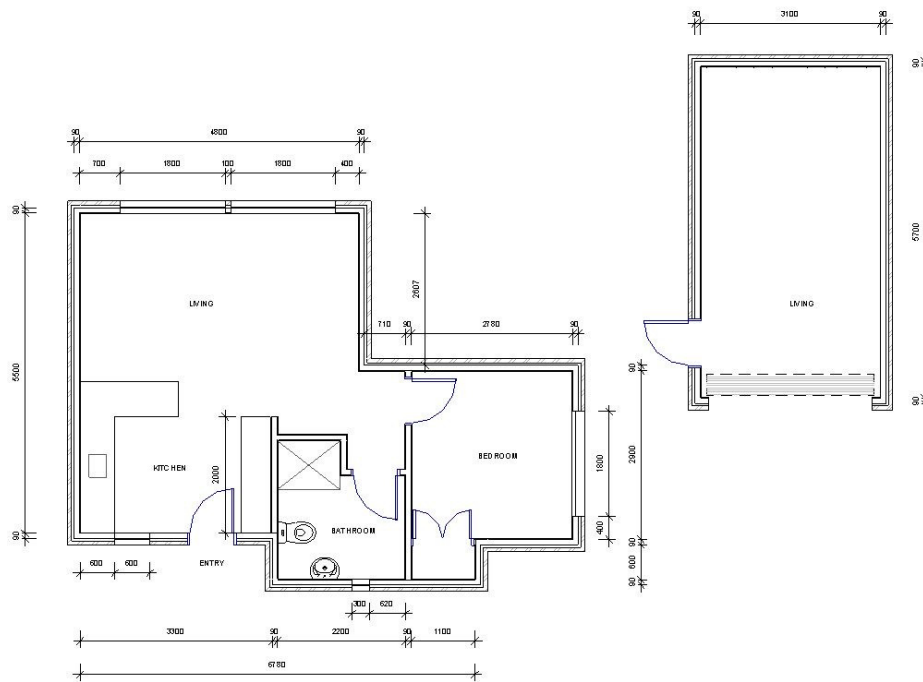


Figure 7: Floor Plan of Block G and H –of Unit 2 and Unit Garage.

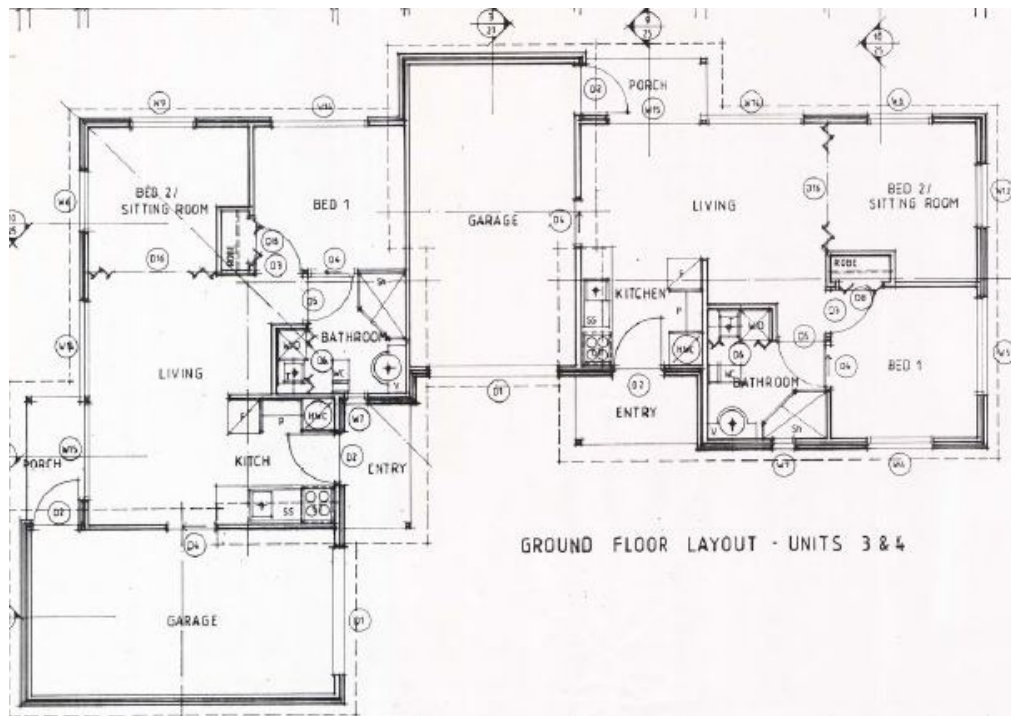


Figure 8: Floor Plan of Block I –of Units 3,4.

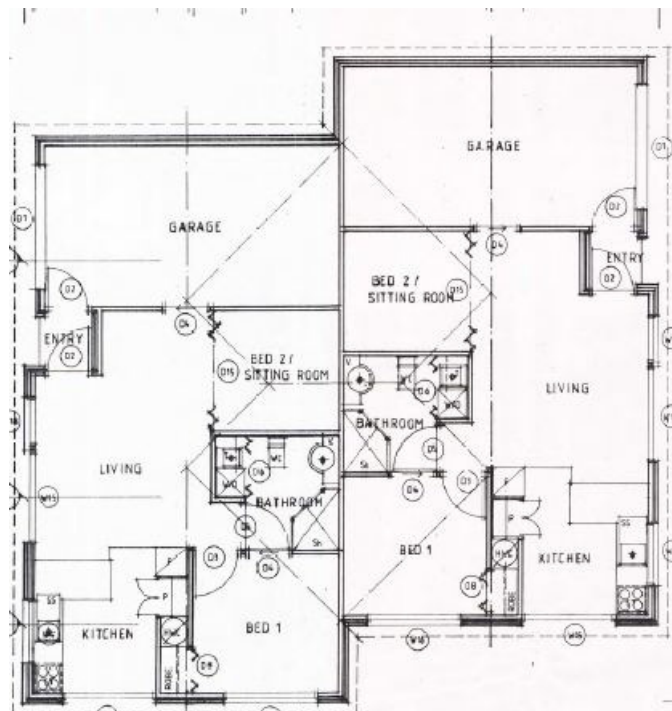


Figure 9: Floor Plan of Block J –of Units 5,8.

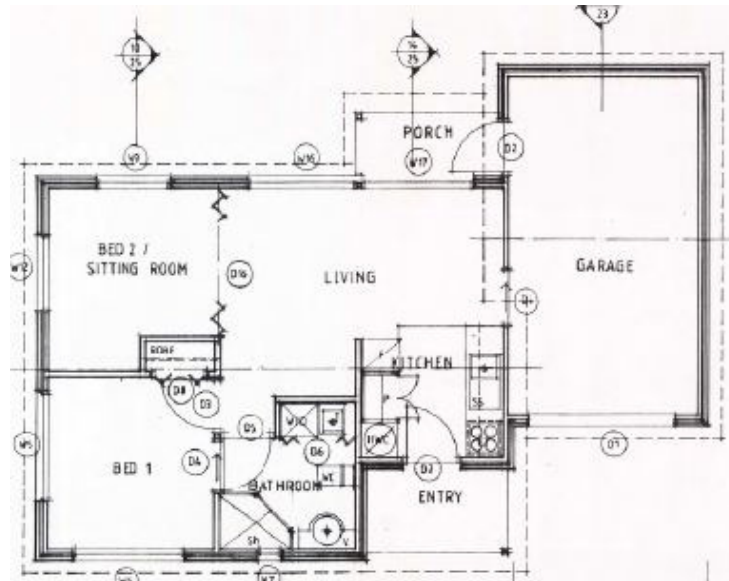


Figure 10: Floor Plan of Block K –of Unit 9.

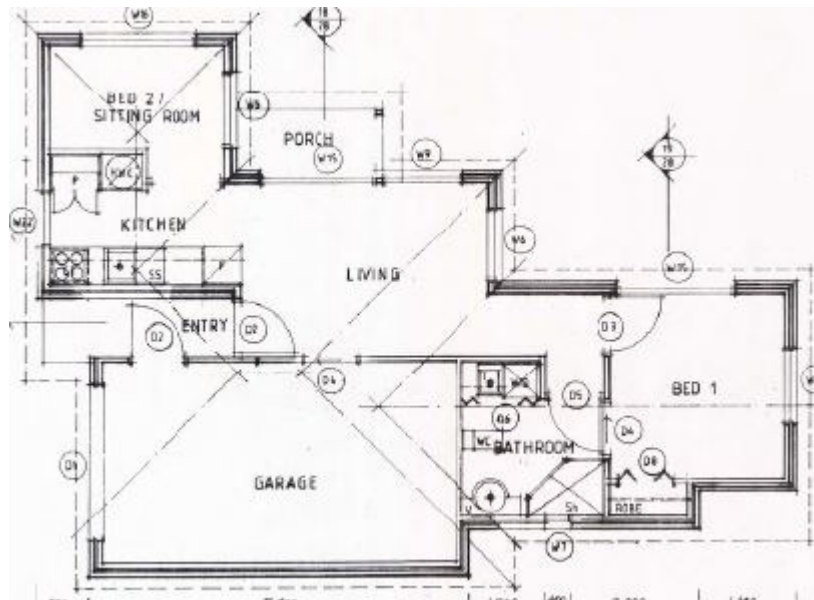


Figure 11: Floor Plan of Block L –of Unit 10.

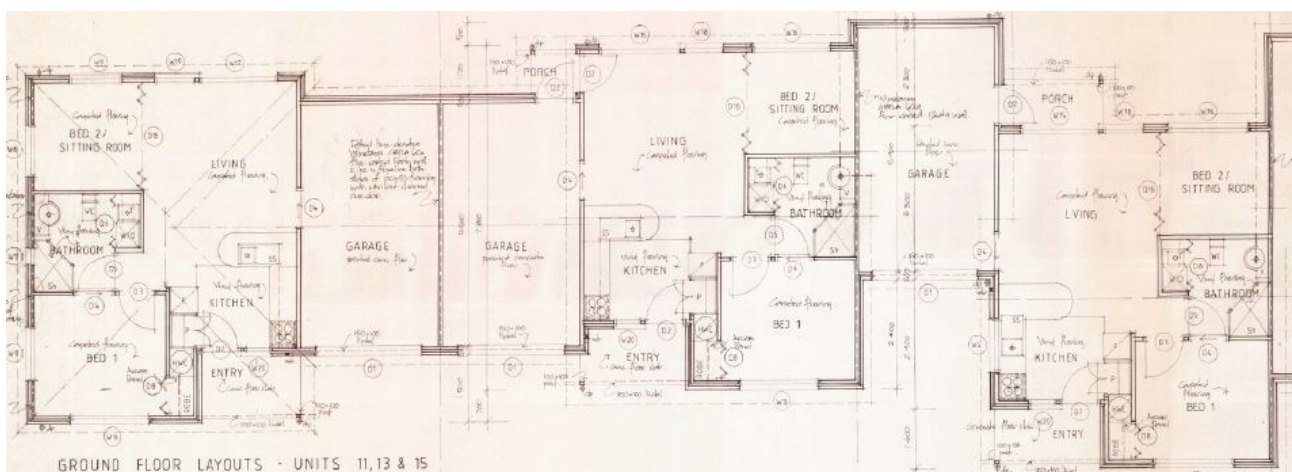


Figure 12: Floor Plan of Block M –of Units 11,13,15.



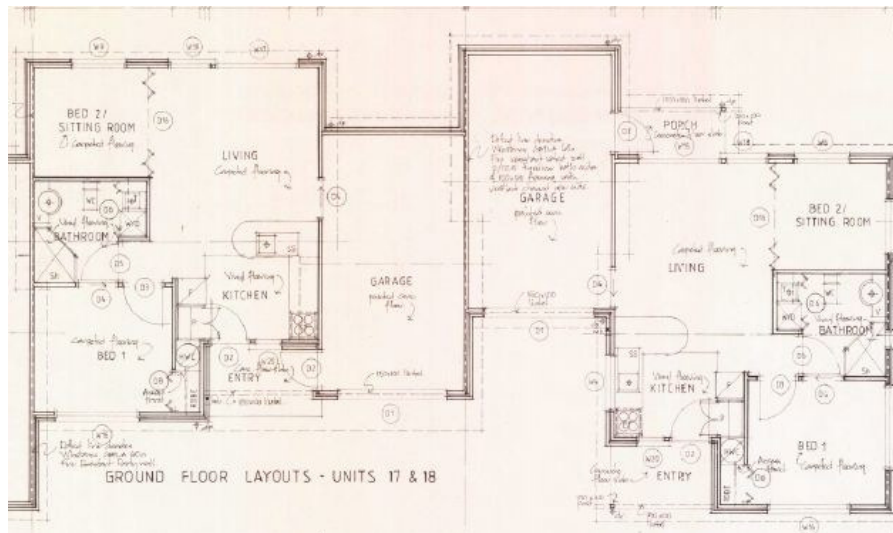


Figure 13: Floor Plan of Block M –of Units 17,18.

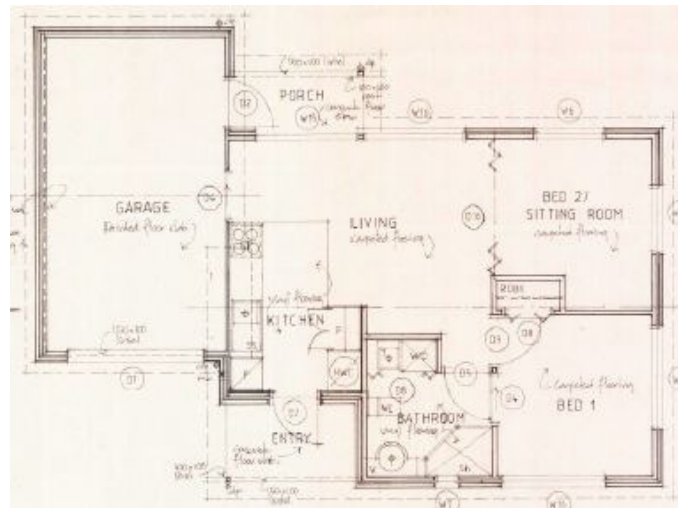


Figure 14: Floor Plan of Block N –of Unit 20.



J	5	Pass	-
	8	Pass	-
K	9	Pass	-
L	10	Pass	-
M	11	Pass	-
	13	Pass	-
	15	Pass	-
	17	Pass	-
	18	Pass	-
N	20	Pass	-

\* Values are only recorded if greater than 5mm/m

### 4.2.3 Nail Spacings

The internal lining nail spacings were measured on site to vary between 350-400mm.

## 4.3 Original Documentation

- 97045 – Christchurch City Council – Proposed Retirement Housing – Building Consent Documentation – 1998.

## 5 Damage

This section outlines the damage to the buildings that was observed during site visits. It is not intended to be a complete summary of the damage sustained by the buildings due to the earthquakes. Some forms of damage may not be able to be identified with a visual inspection only.

It is noticeable that some residential unit blocks, and individual units, have suffered more damage than others. Overall, Unit 13 appears to have suffered the highest level of damage.

Note: Any photo referenced in this section can be found in Appendix A.

### 5.1 Residual Displacements

The results of the level survey indicate that no significant ground settlement has occurred in the units due to the earthquakes.

### 5.2 Foundations

Foundation damage was observed in Units 12, 13, 17, 19. Cracks were observed running through garage areas where no floor coverings were present.

Unit 13 has a severe (5mm) crack in the kitchen area.

### 5.3 Primary Gravity Structure

No damage was evident in the timber framing or roof structure.

## 5.4 Primary Lateral-Resistance Structure

No damage was evident to the primary lateral resistance structure.

## 5.5 Non Structural Elements

Minimal cracking of plasterboard ceiling diaphragms and wall linings was observed in the units. This form of damage is common throughout the units.

Ground settlement has caused steps between external paving to develop which present potential trip hazards to elderly residents.

## 5.6 General Observations

With the exception of Unit 13, the buildings appeared to have performed reasonably well, as would be expected for buildings of this type, during the earthquakes. They have suffered distributed amounts of minor damage which is typical of the construction type and age of construction.

# 6 Detailed Seismic Assessment

The detailed seismic assessment has been based on the NZSEE 2006 [2] guidelines for the “Assessment and Improvement of the Structural Performance of Buildings in Earthquakes” together with the “Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury, Part 2 Evaluation Procedure” [3] draft document prepared by the Engineering Advisory Group on 19 July 2011, and the SESOC guidelines “Practice Note – Design of Conventional Structural Systems Following Canterbury Earthquakes” [5] issued on 21 December 2011.

As the residential units have the same floor plan, the analysis was simplified by conducting the analysis of one multi-unit block with brick cladding and using this for all multi-unit blocks.

## 6.1 Critical Structural Weaknesses

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 a building.

No CSWs were identified in the buildings.

## 6.2 Quantitative Assessment Methodology

The assessment assumptions and methodology have been included in Appendix D. A brief summary follows:

Hand calculations were performed to determine seismic forces from the current building codes. These forces were applied globally to the structure and the capacities of the bracing walls were calculated and used to estimate the %NBS.

### 6.3 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 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.
- Construction is consistent with normal practise of the era in which constructed.

### 6.4 Assessment

A summary of the structural performance of the buildings is shown in Table 3. Note that the values given represent the worst performing elements in the building, where these effectively define the building's capacity. Other elements within the building may have significantly greater capacity when compared with the governing elements.

**Table 3: Summary of Seismic Performance**

<b>Block</b>	<b>% NBS based on calculated capacity in longitudinal direction.</b>	<b>% NBS based on calculated capacity in transverse direction</b>
PRO 2631 B001 (Block A)	100%	73%
PRO 2631 B002 (Block B)	100%	73%
PRO 2631 B003 (Block C)	100%	73%
PRO 2631 B004 (Block D)	100%	73%
PRO 2631 B005 (Block E)	100%	73%

PRO 2631 B006 (Block F)	100%	73%
PRO 2631 B007 (Block G)	100%	100%
PRO 2631 B008 (Block H)	100%	100%
PRO 2631 B009 (Block I)	100%	100%
PRO 2631 B010 (Block J)	100%	73%
PRO 2631 B011 (Block K)	100%	100%
PRO 2631 B012 (Block L)	100%	73%
PRO 2631 B013 (Block M)	100%	81%
PRO 2631 B014 (Block N)	100%	100%

## 7 Geotechnical Summary

CERA indicates that Cedar Park is located in a TC2 zone (as shown in Figure 16). This classification suggests future significant earthquakes will cause minor to moderate land damage due to liquefaction and settlement.

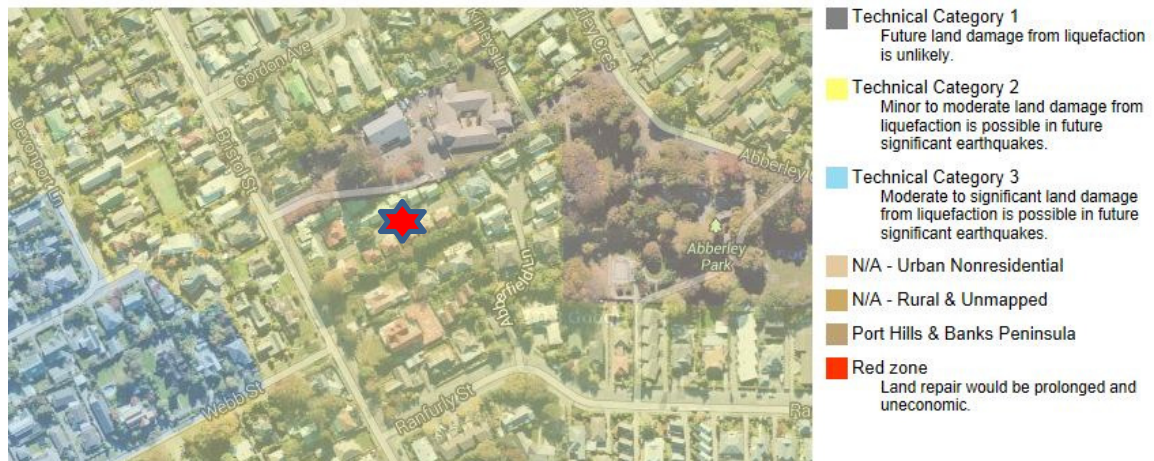


Figure 16: CERA Technical Categories map (loc. starred).

The type of movement evident in the floor slab cracks suggests that further geotechnical investigation is warranted for this site.



## 8 Conclusions

- None of the buildings on site are considered to be Earthquake Prone.
- The residential units have a minimum capacity of 73% NBS, as limited by the in-plane capacity of the bracing walls. They are deemed to be a 'low risk' in a design seismic event according to NZSEE guidelines. Their level of risk is 2-5 times that of a 100% NBS building (Figure 1).
- The cracks visible in the floor slabs of the garages and through the floor coverings of Unit 13 indicate that there has been some lateral movement of these units.

## 9 Recommendations

It is recommended that;

- Veneer at height (gable ends) have the veneer ties checked.
- Repairs be undertaken to affected areas of exterior paving to remove trip hazards.
- A site specific geotechnical site investigation be carried out to determine the cause of cracking in the floor slabs.
- Cosmetic repairs be undertaken as required.

## 10 Limitations

- This report is based on an inspection of the buildings and focuses on the structural damage resulting from the Canterbury Earthquake sequence since September 2010. Some non-structural damage may be described but this is not intended to be a complete list of damage to non-structural items.
- 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 this time.
- This report is prepared for the Christchurch City Council to assist in the assessment of any remedial works required for the Cedar Park Housing Complex. It is not intended for any other party or purpose.

## 11 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 (2011), Practice Note – Design of Conventional Structural Systems Following Canterbury Earthquakes, Structural Engineering Society of New Zealand, 21 December 2011.
- [6] MBIE (2012), Repairing and rebuilding houses affected by the Canterbury earthquakes, Ministry of Building, Innovation and Employment, December 2012.




## **Appendix A - Photographs**

**Cedar Park Housing Complex – Detailed Engineering Evaluation**

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Cedar Park Housing Complex		
No.	Item description	Photo
Residential Units		
1.	Block A – Unit 1,6	
2.	Block B – Unit 7	

**Cedar Park Housing Complex – Detailed Engineering Evaluation**

<p>3.</p>	<p>Block C - Unit 12</p>	
<p>4.</p>	<p>Block D – Unit 14</p>	
<p>5.</p>	<p>Block E – Unit 16</p>	



Cedar Park Housing Complex – Detailed Engineering Evaluation

6.	Block F – Unit 19	
7.	Block G – Unit 2	
8.	Blocks G and H – Unit 2 and Garage	

**Cedar Park Housing Complex – Detailed Engineering Evaluation**



9.	Block I – Unit 3,4	
10.	Block J – Unit 5,8	
11.	Block K – Unit 9	





**Cedar Park Housing Complex – Detailed Engineering Evaluation**

12.	Block L – Unit 10	
13.	Block M – Unit 11,12,15,17,18	
14.	Block N – Unit 20	

Cedar Park Housing Complex – Detailed Engineering Evaluation




15.	Block N – Unit 20	
16.	Typical ceiling space	






17.	Plasterboard nail spacings (300mm average)	
18.	Unit 13 - Crack in kitchen floor slab	



Cedar Park Housing Complex – Detailed Engineering Evaluation

19.	Unit 13 - Crack in kitchen floor slab	 A photograph showing a vertical crack in a light-colored, textured floor slab. A yellow measuring tape is placed horizontally across the crack to provide scale. The crack is approximately 1/8 inch wide and runs vertically through the center of the frame.
20.	Unit 12 - Crack in garage floor slab	 A photograph showing a vertical crack in a light-colored, textured floor slab. A yellow measuring tape is placed horizontally across the crack to provide scale. The crack is approximately 1/8 inch wide and runs vertically through the center of the frame.
21.	Unit 17 - Crack in garage floor slab	 A photograph showing a vertical crack in a light-colored, textured floor slab. A person's hand is placed horizontally next to the crack to provide scale. The crack is approximately 1/8 inch wide and runs vertically through the center of the frame.

Cedar Park Housing Complex – Detailed Engineering Evaluation

<p>22.</p>	<p>Crack in driveway paving</p>	
<p>23.</p>	<p>Unit 1,6 – Step in paving</p>	
<p>24.</p>	<p>Unit 1,6 – Step in paving</p>	



25.	Typical step in external paving	
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## **Appendix B - Methodology and Assumptions**

## Seismic Parameters

As per NZS 1170.5:

- $T < 0.4s$  (assumed)
- Soil: Category D
- $Z = 0.3$
- $R = 1.0$  (IL2, 50 year)
- $N(T,D) = 1.0$

For the analyses, a  $\mu$  of 2 was assumed for the residential units.

## Analysis Procedure

As the units are small and have a number of closely spaced walls in both directions, the fibrous plaster board ceilings are assumed to be capable of transferring loads to all walls. It was therefore assumed that a global method could be used to carry the forces down to ground level in each direction. Bracing capacities were found by assuming a certain kN/m rating for the walls along each line. Due to the relatively unknown nature of the walls, the kN/m rating was taken as 3 kN/m for all timber walls with an aspect ratio (height: length) of less than 2:1. This was scaled down to zero kN/m at an aspect ratio of 3.5:1 as per NZSEE guidelines. %NBS values were then found through the ratio of bracing demand to bracing capacity for all walls in each direction.

## Additional Assumptions

Further assumptions about the seismic performance of the buildings were:

- Foundations and foundation connections had adequate capacity to resist and transfer earthquake loads.
- Connections between all elements of the lateral load resisting systems are detailed to adequately transfer their loads sufficiently and are strong enough so as to not fail before the lateral load resisting elements.

## **Appendix C – CERA DEE Spreadsheet**

<b>Location</b>		Building Name: Cedar Park Housing Complex Block A	Unit No: Street	Reviewer: Mary Ann Halliday
Building Address:	90	Bristol	CPEng No: 67073	Company: Opus International Consultants
Legal Description:			Company project number: 6-OC327.00	Company phone number:
	Degrees	Min	Sec	Date of submission: 20-Dec-13
GPS south:	43	30	49.99	Inspection Date: 26/10/2013
GPS east:	172	37	39.00	Revision: 1
Building Unique Identifier (CCC):	PRO2631		Is there a full report with this summary? yes	

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

<b>Building</b>	No. of storeys above ground: 1	single storey = 1	Ground floor elevation (Absolute) (m):
Ground floor split?	no		Ground floor elevation above ground (m):
Storeys below ground:	0		if Foundation type is other, describe:
Foundation type:	strip footings	height from ground to level of uppermost seismic mass (for IEP only) (m):	Date of design: 1992-2004
Building height (m):	3.00		
Floor footprint area (approx):	134		
Age of Building (years):	12		
Strengthening present?	no		If so, when (year)?
Use (ground floor):	multi-unit residential		And what load level (%g)?
Use (upper floors):			Brief strengthening description:
Use notes (if required):			
Importance level (to NZS1170.5):	IL2		

<b>Gravity Structure</b>	Gravity System: frame system	truss depth, purlin type and cladding
Roof: timber truss		slab thickness (mm)
Floors: concrete flat slab		overall depth x width (mm x mm)
Beams: none		typical dimensions (mm x mm)
Columns: timber		0
Walls: non-load bearing		

<b>Lateral load resisting structure</b>	Lateral system along: lightweight timber framed walls	<b>Note: Define along and across in detailed report!</b>	note typical wall length (m)
Ductility assumed, μ:	2.00		0.00
Period along:	0.10		0.00
Total deflection (ULS) (mm):			estimate or calculation? estimated
maximum interstorey deflection (ULS) (mm):			estimate or calculation?
Lateral system across: lightweight timber framed walls			note typical wall length (m)
Ductility assumed, μ:	2.00		0.00
Period across:	0.10		0.00
Total deflection (ULS) (mm):			estimate or calculation? estimated
maximum interstorey deflection (ULS) (mm):			estimate or calculation?

<b>Separations:</b>	north (mm):	leave blank if not relevant
east (mm):		
south (mm):		
west (mm):		

<b>Non-structural elements</b>	Stairs:		describe (note cavity if exists)
Wall cladding: brick or tile			describe
Roof Cladding: Metal			
Glazing: aluminium frames			
Ceilings: strapped or direct fixed			
Services(list):			

<b>Available documentation</b>	Architectural: partial	original designer name/date:
Structural: partial		original designer name/date:
Mechanical: none		original designer name/date:
Electrical: none		original designer name/date:
Geotech report: none		original designer name/date:

<b>Damage Site:</b>	Site performance: Good	Describe damage:
(refer DEE Table 4-2)	Settlement: none observed	notes (if applicable):
Differential settlement: none observed		notes (if applicable):
Liquefaction:		notes (if applicable):
Lateral Spread:		notes (if applicable):
Differential lateral spread:		notes (if applicable):
Ground cracks:		notes (if applicable):
Damage to area:		notes (if applicable):

<b>Building:</b>	Current Placard Status: green	
Along	Damage ratio: 0%	Describe how damage ratio arrived at:
Describe (summary):		
Across	Damage ratio: 0%	$Damage\_Ratio = \frac{(\%NBS\ (before) - \%NBS\ (after))}{\%NBS\ (before)}$
Describe (summary):		
Diaphragms	Damage?: no	Describe:
CSWs:	Damage?: no	Describe:
Pounding:	Damage?: no	Describe:
Non-structural:	Damage?: yes	Describe:

<b>Recommendations</b>	Level of repair/strengthening required: minor non-structural	Describe:
Building Consent required: no		Describe:
Interim occupancy recommendations: full occupancy		Describe:
Along	Assessed %NBS before e'quakes: 100% ##### %NBS from IEP below	If IEP not used, please detail assessment methodology:
Assessed %NBS after e'quakes: 100%	Equivalent Static	
Across	Assessed %NBS before e'quakes: 73% ##### %NBS from IEP below	
Assessed %NBS after e'quakes: 73%		

<b>Location</b>		Building Name: Cedar Park Housing Complex B, C, D, & E	Reviewer: Mary Ann Halliday
Building Address: _____	Unit No: 90	Street: Bristol	CPEng No: 67073
Legal Description: _____			Company: Opus International Consultants
			Company project number: 6-OC327.00
			Company phone number: _____
	Degrees	Min	Sec
GPS south: _____	43	30	49.99
GPS east: _____	172	37	39.00
Building Unique Identifier (CCC): PRO2631			Date of submission: 20-Dec-13
			Inspection Date: 26/10/2013
			Revision: 1
			Is there a full report with this summary? yes

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

<b>Building</b>	No. of storeys above ground: 1	single storey = 1	Ground floor elevation (Absolute) (m): _____
	Ground floor split? no		Ground floor elevation above ground (m): _____
	Storeys below ground: 0		
	Foundation type: strip footings		if Foundation type is other, describe: _____
	Building height (m): 3.00	height from ground to level of uppermost seismic mass (for IEP only) (m): _____	
	Floor footprint area (approx): 70		Date of design: 1992-2004
	Age of Building (years): 12		
	Strengthening present? no		If so, when (year)? _____
	Use (ground floor): multi-unit residential		And what load level (%g)? _____
	Use (upper floors): _____		Brief strengthening description: _____
	Use notes (if required): _____		
	Importance level (to NZS1170.5): IL2		

<b>Gravity Structure</b>	Gravity System: frame system	
	Roof: timber truss	truss depth, purlin type and cladding
	Floors: concrete flat slab	slab thickness (mm)
	Beams: none	overall depth x width (mm x mm)
	Columns: timber	typical dimensions (mm x mm)
	Walls: non-load bearing	0

<b>Lateral load resisting structure</b>	Lateral system along: lightweight timber framed walls	<b>Note: Define along and across in detailed report!</b>	note typical wall length (m) _____
	Ductility assumed, μ: 2.00		estimate or calculation? <b>estimated</b>
	Period along: 0.10		estimate or calculation? _____
	Total deflection (ULS) (mm): _____	0.00	estimate or calculation? _____
	maximum interstorey deflection (ULS) (mm): _____		
	Lateral system across: lightweight timber framed walls		note typical wall length (m) _____
	Ductility assumed, μ: 2.00		estimate or calculation? <b>estimated</b>
	Period across: 0.10		estimate or calculation? _____
	Total deflection (ULS) (mm): _____	0.00	estimate or calculation? _____
	maximum interstorey deflection (ULS) (mm): _____		

<b>Separations:</b>	north (mm): _____	leave blank if not relevant
	east (mm): _____	
	south (mm): _____	
	west (mm): _____	

<b>Non-structural elements</b>	Stairs: _____	
	Wall cladding: brick or tile	describe (note cavity if exists) Weatherboard
	Roof Cladding: Metal	describe _____
	Glazing: aluminium frames	
	Ceilings: strapped or direct fixed	
	Services(list): _____	

<b>Available documentation</b>	Architectural: partial	original designer name/date _____
	Structural: partial	original designer name/date _____
	Mechanical: none	original designer name/date _____
	Electrical: none	original designer name/date _____
	Geotech report: none	original designer name/date _____

<b>Damage</b>	Site performance: Good	Describe damage: _____
<b>Site:</b> (refer DEE Table 4-2)	Settlement: none observed	notes (if applicable): _____
	Differential settlement: none observed	notes (if applicable): _____
	Liquefaction: _____	notes (if applicable): _____
	Lateral Spread: _____	notes (if applicable): _____
	Differential lateral spread: _____	notes (if applicable): _____
	Ground cracks: _____	notes (if applicable): _____
	Damage to area: _____	notes (if applicable): _____

<b>Building:</b>	Current Placard Status: green	
<b>Along</b>	Damage ratio: 0%	Describe how damage ratio arrived at: _____
	Describe (summary): _____	
<b>Across</b>	Damage ratio: 0%	$Damage\_Ratio = \frac{(\%NBS\ (before) - \%NBS\ (after))}{\%NBS\ (before)}$
	Describe (summary): _____	
<b>Diaphragms</b>	Damage?: no	Describe: _____
<b>CSWs:</b>	Damage?: no	Describe: _____
<b>Pounding:</b>	Damage?: no	Describe: _____
<b>Non-structural:</b>	Damage?: yes	Describe: _____

<b>Recommendations</b>	Level of repair/strengthening required: minor non-structural	Describe: _____
	Building Consent required: no	Describe: _____
	Interim occupancy recommendations: full occupancy	Describe: _____
<b>Along</b>	Assessed %NBS before e'quakes: 100%	#### %NBS from IEP below
	Assessed %NBS after e'quakes: 100%	
<b>Across</b>	Assessed %NBS before e'quakes: 73%	#### %NBS from IEP below
	Assessed %NBS after e'quakes: 73%	
		If IEP not used, please detail assessment methodology: Equivalent Static



<b>Location</b>		Building Name: Cedar Park Housing Complex Block F	Unit No: Street	Reviewer: Mary Ann Halliday
Building Address:	90	Bristol	CPEng No: 67073	Company: Opus International Consultants
Legal Description:			Company project number: 6-OC327.00	Company phone number:
	Degrees	Min	Sec	Date of submission: 20-Dec-13
GPS south:	43	30	49.99	Inspection Date: 26/10/2013
GPS east:	172	37	39.00	Revision: 1
Building Unique Identifier (CCC):	PRO2631		Is there a full report with this summary? yes	

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

<b>Building</b>	No. of storeys above ground: 1	single storey = 1	Ground floor elevation (Absolute) (m):
Ground floor split?	no		Ground floor elevation above ground (m):
Storeys below ground:	0		if Foundation type is other, describe:
Foundation type:	strip footings	height from ground to level of uppermost seismic mass (for IEP only) (m):	Date of design: 1992-2004
Building height (m):	3.00		
Floor footprint area (approx):	75		
Age of Building (years):	12		
Strengthening present?	no		If so, when (year)?
Use (ground floor):	multi-unit residential		And what load level (%g)?
Use (upper floors):			Brief strengthening description:
Use notes (if required):			
Importance level (to NZS1170.5):	IL2		

<b>Gravity Structure</b>	Gravity System: frame system	truss depth, purlin type and cladding
Roof:	timber truss	slab thickness (mm)
Floors:	concrete flat slab	overall depth x width (mm x mm)
Beams:	none	typical dimensions (mm x mm)
Columns:	timber	0
Walls:	non-load bearing	

<b>Lateral load resisting structure</b>	Lateral system along: lightweight timber framed walls	Note: Define along and across in detailed report!	note typical wall length (m)
Ductility assumed, μ:	2.00		0.00
Period along:	0.10		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:	2.00		0.00
Period across:	0.10		estimate or calculation? estimated
Total deflection (ULS) (mm):			estimate or calculation?
maximum interstorey deflection (ULS) (mm):			estimate or calculation?

<b>Separations:</b>	north (mm):	leave blank if not relevant
east (mm):		
south (mm):		
west (mm):		

<b>Non-structural elements</b>	Stairs:		describe (note cavity if exists)
Wall cladding:	brick or tile		Weatherboard
Roof Cladding:	Metal		describe
Glazing:	aluminium frames		
Ceilings:	strapped or direct fixed		
Services(list):			

<b>Available documentation</b>	Architectural: partial	original designer name/date:
Structural: partial		original designer name/date:
Mechanical: none		original designer name/date:
Electrical: none		original designer name/date:
Geotech report: none		original designer name/date:

<b>Damage Site:</b>	Site performance: Good	Describe damage:
(refer DEE Table 4-2)	Settlement: none observed	notes (if applicable):
Differential settlement: none observed		notes (if applicable):
Liquefaction:		notes (if applicable):
Lateral Spread:		notes (if applicable):
Differential lateral spread:		notes (if applicable):
Ground cracks:		notes (if applicable):
Damage to area:		notes (if applicable):

<b>Building:</b>	Current Placard Status: green	
Along	Damage ratio: 0%	Describe how damage ratio arrived at:
Describe (summary):		
Across	Damage ratio: 0%	$Damage\_Ratio = \frac{(\%NBS\ (before) - \%NBS\ (after))}{\%NBS\ (before)}$
Describe (summary):		
Diaphragms	Damage?: no	Describe:
CSWs:	Damage?: no	Describe:
Pounding:	Damage?: no	Describe:
Non-structural:	Damage?: yes	Describe:

<b>Recommendations</b>	Level of repair/strengthening required: minor non-structural	Describe:
Building Consent required: no		Describe:
Interim occupancy recommendations: full occupancy		Describe:
Along	Assessed %NBS before e'quakes: 100% ##### %NBS from IEP below	If IEP not used, please detail assessment methodology:
Assessed %NBS after e'quakes: 100%		Equivalent Static
Across	Assessed %NBS before e'quakes: 73% ##### %NBS from IEP below	
Assessed %NBS after e'quakes: 73%		

<b>Location</b>		Building Name: Cedar Park Housing Complex Block G	Reviewer: Mary Ann Halliday
Building Address: _____	Unit No: 90	Street: Bristol	CPEng No: 67073
Legal Description: _____			Company: Opus International Consultants
			Company project number: 6-OC327.00
			Company phone number: _____
	Degrees	Min	Sec
GPS south: _____	43	30	49.99
GPS east: _____	172	37	39.00
Building Unique Identifier (CCC): PRO2631			Date of submission: 20-Dec-13
			Inspection Date: 26/10/2013
			Revision: 1
			Is there a full report with this summary? yes

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

<b>Building</b>	No. of storeys above ground: 1	single storey = 1	Ground floor elevation (Absolute) (m): _____
	Ground floor split? no		Ground floor elevation above ground (m): _____
	Storeys below ground: 0		
	Foundation type: strip footings		if Foundation type is other, describe: _____
	Building height (m): 3.00	height from ground to level of uppermost seismic mass (for IEP only) (m): _____	
	Floor footprint area (approx): 60		Date of design: 1992-2004
	Age of Building (years): 12		
	Strengthening present? no		If so, when (year)? _____
	Use (ground floor): multi-unit residential		And what load level (%g)? _____
	Use (upper floors): _____		Brief strengthening description: _____
	Use notes (if required): _____		
	Importance level (to NZS1170.5): IL2		

<b>Gravity Structure</b>	Gravity System: frame system	truss depth, purlin type and cladding _____
	Roof: timber truss	slab thickness (mm) _____
	Floors: concrete flat slab	overall depth x width (mm x mm) _____
	Beams: none	typical dimensions (mm x mm) _____
	Columns: timber	0 _____
	Walls: non-load bearing	

<b>Lateral load resisting structure</b>	Lateral system along: lightweight timber framed walls	<b>Note: Define along and across in detailed report!</b>	note typical wall length (m) _____
	Ductility assumed, μ: 2.00		estimate or calculation? <b>estimated</b>
	Period along: 0.10		estimate or calculation? _____
	Total deflection (ULS) (mm): _____	0.00	estimate or calculation? _____
	maximum interstorey deflection (ULS) (mm): _____		
	Lateral system across: lightweight timber framed walls		note typical wall length (m) _____
	Ductility assumed, μ: 2.00		estimate or calculation? <b>estimated</b>
	Period across: 0.10		estimate or calculation? _____
	Total deflection (ULS) (mm): _____		estimate or calculation? _____
	maximum interstorey deflection (ULS) (mm): _____		

<b>Separations:</b>	north (mm): _____	leave blank if not relevant
	east (mm): _____	
	south (mm): _____	
	west (mm): _____	

<b>Non-structural elements</b>	Stairs: _____	describe (note cavity if exists) _____
	Wall cladding: brick or tile	describe _____
	Roof Cladding: Metal	
	Glazing: aluminium frames	
	Ceilings: strapped or direct fixed	
	Services(list): _____	

<b>Available documentation</b>	Architectural: partial	original designer name/date _____
	Structural: partial	original designer name/date _____
	Mechanical: none	original designer name/date _____
	Electrical: none	original designer name/date _____
	Geotech report: none	original designer name/date _____

<b>Damage Site:</b>	Site performance: Good	Describe damage: _____
(refer DEE Table 4-2)	Settlement: none observed	notes (if applicable): _____
	Differential settlement: none observed	notes (if applicable): _____
	Liquefaction: _____	notes (if applicable): _____
	Lateral Spread: _____	notes (if applicable): _____
	Differential lateral spread: _____	notes (if applicable): _____
	Ground cracks: _____	notes (if applicable): _____
	Damage to area: _____	notes (if applicable): _____

<b>Building:</b>	Current Placard Status: green	
Along	Damage ratio: 0%	Describe how damage ratio arrived at: _____
	Describe (summary): _____	
Across	Damage ratio: 0%	$Damage\_Ratio = \frac{(\%NBS\ (before) - \%NBS\ (after))}{\%NBS\ (before)}$
	Describe (summary): _____	
Diaphragms	Damage?: no	Describe: _____
CSWs:	Damage?: no	Describe: _____
Pounding:	Damage?: no	Describe: _____
Non-structural:	Damage?: yes	Describe: _____

<b>Recommendations</b>	Level of repair/strengthening required: minor non-structural	Describe: _____
	Building Consent required: no	Describe: _____
	Interim occupancy recommendations: full occupancy	Describe: _____
Along	Assessed %NBS before e'quakes: 100%	#### %NBS from IEP below
	Assessed %NBS after e'quakes: 100%	
Across	Assessed %NBS before e'quakes: 100%	#### %NBS from IEP below
	Assessed %NBS after e'quakes: 100%	

If IEP not used, please detail assessment methodology: Equivalent Static

<b>Location</b>		Building Name: Cedar Park Housing Complex Block H	Unit No: Street	Reviewer: Mary Ann Halliday
Building Address:	90	Bristol	CPEng No: 67073	Company: Opus International Consultants
Legal Description:			Company project number: 6-OC327.00	Company phone number:
	Degrees	Min	Sec	Date of submission: 20-Dec-13
GPS south:	43	30	49.99	Inspection Date: 26/10/2013
GPS east:	172	37	39.00	Revision: 1
Building Unique Identifier (CCC):	PRO2631		Is there a full report with this summary? yes	

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

<b>Building</b>	No. of storeys above ground: 1	single storey = 1	Ground floor elevation (Absolute) (m):
Ground floor split?	no		Ground floor elevation above ground (m):
Storeys below ground:	0		if Foundation type is other, describe:
Foundation type:	strip footings	height from ground to level of uppermost seismic mass (for IEP only) (m):	
Building height (m):	3.00	Date of design:	1992-2004
Floor footprint area (approx):	60		
Age of Building (years):	12		
Strengthening present?	no	If so, when (year)?	
Use (ground floor):	multi-unit residential	And what load level (%g)?	
Use (upper floors):		Brief strengthening description:	
Use notes (if required):			
Importance level (to NZS1170.5):	IL2		

<b>Gravity Structure</b>	Gravity System: frame system	truss depth, purlin type and cladding
Roof:	timber truss	slab thickness (mm)
Floors:	concrete flat slab	overall depth x width (mm x mm)
Beams:	none	typical dimensions (mm x mm)
Columns:	timber	0
Walls:	non-load bearing	

<b>Lateral load resisting structure</b>	Lateral system along: lightweight timber framed walls	Note: Define along and across in detailed report!	note typical wall length (m)
Ductility assumed, μ:	2.00		0.00
Period along:	0.10		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:	2.00		0.00
Period across:	0.10		estimate or calculation? estimated
Total deflection (ULS) (mm):			estimate or calculation?
maximum interstorey deflection (ULS) (mm):			estimate or calculation?

<b>Separations:</b>	north (mm):	leave blank if not relevant
east (mm):		
south (mm):		
west (mm):		

<b>Non-structural elements</b>	Stairs:		describe (note cavity if exists)
Wall cladding:	brick or tile		describe
Roof Cladding:	Metal		
Glazing:	aluminium frames		
Ceilings:	strapped or direct fixed		
Services(list):			

<b>Available documentation</b>	Architectural: partial	original designer name/date:
Structural: partial		original designer name/date:
Mechanical: none		original designer name/date:
Electrical: none		original designer name/date:
Geotech report: none		original designer name/date:

<b>Damage Site:</b>	Site performance: Good	Describe damage:
(refer DEE Table 4-2)	Settlement: none observed	notes (if applicable):
Differential settlement: none observed	Liquefaction:	notes (if applicable):
Lateral Spread:	Differential lateral spread:	notes (if applicable):
Ground cracks:	Damage to area:	notes (if applicable):

<b>Building:</b>	Current Placard Status: green	
Along	Damage ratio: 0%	Describe how damage ratio arrived at:
Describe (summary):		
Across	Damage ratio: 0%	$Damage\_Ratio = \frac{(\%NBS\ (before) - \%NBS\ (after))}{\%NBS\ (before)}$
Describe (summary):		
Diaphragms	Damage?: no	Describe:
CSWs:	Damage?: no	Describe:
Pounding:	Damage?: no	Describe:
Non-structural:	Damage?: yes	Describe:

<b>Recommendations</b>	Level of repair/strengthening required: minor non-structural	Describe:
Building Consent required: no		Describe:
Interim occupancy recommendations: full occupancy		Describe:
Along	Assessed %NBS before e'quakes: 100% ##### %NBS from IEP below	If IEP not used, please detail assessment methodology: Equivalent Static
Assessed %NBS after e'quakes: 100%		
Across	Assessed %NBS before e'quakes: 100% ##### %NBS from IEP below	
Assessed %NBS after e'quakes: 100%		

<b>Location</b>		Building Name: Cedar Park Housing Complex Block I	Reviewer: Mary Ann Halliday
Building Address: _____	Unit No: 90	Street: Bristol	CPEng No: 67073
Legal Description: _____			Company: Opus International Consultants
			Company project number: 6-OC327.00
			Company phone number: _____
	Degrees	Min	Sec
GPS south: _____	43	30	49.99
GPS east: _____	172	37	39.00
Building Unique Identifier (CCC): PRO2631			Date of submission: 20-Dec-13
			Inspection Date: 26/10/2013
			Revision: 1
			Is there a full report with this summary? yes

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

<b>Building</b>	No. of storeys above ground: 1	single storey = 1	Ground floor elevation (Absolute) (m): _____
	Ground floor split? no		Ground floor elevation above ground (m): _____
	Storeys below ground: 0		
	Foundation type: strip footings		if Foundation type is other, describe: _____
	Building height (m): 3.00	height from ground to level of uppermost seismic mass (for IEP only) (m): _____	
	Floor footprint area (approx): 132		Date of design: 1992-2004
	Age of Building (years): 12		
	Strengthening present? no		If so, when (year)? _____
	Use (ground floor): multi-unit residential		And what load level (%g)? _____
	Use (upper floors): _____		Brief strengthening description: _____
	Use notes (if required): _____		
	Importance level (to NZS1170.5): IL2		

<b>Gravity Structure</b>	Gravity System: frame system	
	Roof: timber truss	truss depth, purlin type and cladding _____
	Floors: concrete flat slab	slab thickness (mm) _____
	Beams: none	overall depth x width (mm x mm) _____
	Columns: timber	typical dimensions (mm x mm) _____
	Walls: non-load bearing	0 _____

<b>Lateral load resisting structure</b>	Lateral system along: lightweight timber framed walls	<b>Note: Define along and across in detailed report!</b>	note typical wall length (m) _____
	Ductility assumed, μ: 2.00		estimate or calculation? <b>estimated</b>
	Period along: 0.10		estimate or calculation? _____
	Total deflection (ULS) (mm): _____	0.00	estimate or calculation? _____
	maximum interstorey deflection (ULS) (mm): _____		
	Lateral system across: lightweight timber framed walls		note typical wall length (m) _____
	Ductility assumed, μ: 2.00		estimate or calculation? <b>estimated</b>
	Period across: 0.10		estimate or calculation? _____
	Total deflection (ULS) (mm): _____	0.00	estimate or calculation? _____
	maximum interstorey deflection (ULS) (mm): _____		

<b>Separations:</b>	north (mm): _____	leave blank if not relevant
	east (mm): _____	
	south (mm): _____	
	west (mm): _____	

<b>Non-structural elements</b>	Stairs: _____	
	Wall cladding: brick or tile	describe (note cavity if exists) Weatherboard
	Roof Cladding: Metal	describe _____
	Glazing: aluminium frames	
	Ceilings: strapped or direct fixed	
	Services(list): _____	

<b>Available documentation</b>	Architectural: partial	original designer name/date _____
	Structural: partial	original designer name/date _____
	Mechanical: none	original designer name/date _____
	Electrical: none	original designer name/date _____
	Geotech report: none	original designer name/date _____

<b>Damage Site:</b>	Site performance: Good	Describe damage: _____
(refer DEE Table 4-2)	Settlement: none observed	notes (if applicable): _____
	Differential settlement: none observed	notes (if applicable): _____
	Liquefaction: _____	notes (if applicable): _____
	Lateral Spread: _____	notes (if applicable): _____
	Differential lateral spread: _____	notes (if applicable): _____
	Ground cracks: _____	notes (if applicable): _____
	Damage to area: _____	notes (if applicable): _____

<b>Building:</b>	Current Placard Status: green	
Along	Damage ratio: 0%	Describe how damage ratio arrived at: _____
	Describe (summary): _____	
Across	Damage ratio: 0%	$Damage\_Ratio = \frac{(\%NBS\ (before) - \%NBS\ (after))}{\%NBS\ (before)}$
	Describe (summary): _____	
Diaphragms	Damage?: no	Describe: _____
CSWs:	Damage?: no	Describe: _____
Pounding:	Damage?: no	Describe: _____
Non-structural:	Damage?: yes	Describe: _____

<b>Recommendations</b>	Level of repair/strengthening required: minor non-structural	Describe: _____
	Building Consent required: no	Describe: _____
	Interim occupancy recommendations: full occupancy	Describe: _____
Along	Assessed %NBS before e'quakes: 100%	#### %NBS from IEP below
	Assessed %NBS after e'quakes: 100%	
Across	Assessed %NBS before e'quakes: 100%	#### %NBS from IEP below
	Assessed %NBS after e'quakes: 100%	
		If IEP not used, please detail Equivalent Static assessment methodology: _____

<b>Location</b>		Building Name: Cedar Park Housing Complex Block J	Reviewer: Mary Ann Halliday
Building Address: _____	Unit No: 90	Street: Bristol	CPEng No: 67073
Legal Description: _____			Company: Opus International Consultants
			Company project number: 6-OC327.00
			Company phone number: _____
	Degrees	Min	Sec
GPS south: _____	43	30	49.99
GPS east: _____	172	37	39.00
Building Unique Identifier (CCC): PRO2631			Date of submission: 20-Dec-13
			Inspection Date: 26/10/2013
			Revision: 1
			Is there a full report with this summary? yes

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

<b>Building</b>	No. of storeys above ground: 1	single storey = 1	Ground floor elevation (Absolute) (m): _____
	Ground floor split? no		Ground floor elevation above ground (m): _____
	Storeys below ground: 0		
	Foundation type: strip footings		if Foundation type is other, describe: _____
	Building height (m): 3.00	height from ground to level of uppermost seismic mass (for IEP only) (m): _____	
	Floor footprint area (approx): 88		Date of design: 1992-2004
	Age of Building (years): 12		
	Strengthening present? no		If so, when (year)? _____
	Use (ground floor): multi-unit residential		And what load level (%g)? _____
	Use (upper floors): _____		Brief strengthening description: _____
	Use notes (if required): _____		
	Importance level (to NZS1170.5): IL2		

<b>Gravity Structure</b>	Gravity System: frame system	truss depth, purlin type and cladding _____
	Roof: timber truss	slab thickness (mm) _____
	Floors: concrete flat slab	overall depth x width (mm x mm) _____
	Beams: none	typical dimensions (mm x mm) _____
	Columns: timber	0 _____
	Walls: non-load bearing	

<b>Lateral load resisting structure</b>	Lateral system along: lightweight timber framed walls	<b>Note: Define along and across in detailed report!</b>	note typical wall length (m) _____
	Ductility assumed, μ: 2.00		estimate or calculation? <b>estimated</b>
	Period along: 0.10		estimate or calculation? _____
	Total deflection (ULS) (mm): _____	0.00	estimate or calculation? _____
	maximum interstorey deflection (ULS) (mm): _____		
	Lateral system across: lightweight timber framed walls		note typical wall length (m) _____
	Ductility assumed, μ: 2.00		estimate or calculation? <b>estimated</b>
	Period across: 0.10		estimate or calculation? _____
	Total deflection (ULS) (mm): _____	0.00	estimate or calculation? _____
	maximum interstorey deflection (ULS) (mm): _____		

<b>Separations:</b>	north (mm): _____	leave blank if not relevant
	east (mm): _____	
	south (mm): _____	
	west (mm): _____	

<b>Non-structural elements</b>	Stairs: _____	describe (note cavity if exists) _____
	Wall cladding: brick or tile	describe: Weatherboard
	Roof Cladding: Metal	
	Glazing: aluminium frames	
	Ceilings: strapped or direct fixed	
	Services(list): _____	

<b>Available documentation</b>	Architectural: partial	original designer name/date: _____
	Structural: partial	original designer name/date: _____
	Mechanical: none	original designer name/date: _____
	Electrical: none	original designer name/date: _____
	Geotech report: none	original designer name/date: _____

<b>Damage Site:</b>	Site performance: Good	Describe damage: _____
(refer DEE Table 4-2)	Settlement: none observed	notes (if applicable): _____
	Differential settlement: none observed	notes (if applicable): _____
	Liquefaction: _____	notes (if applicable): _____
	Lateral Spread: _____	notes (if applicable): _____
	Differential lateral spread: _____	notes (if applicable): _____
	Ground cracks: _____	notes (if applicable): _____
	Damage to area: _____	notes (if applicable): _____

<b>Building:</b>	Current Placard Status: green	
Along	Damage ratio: 0%	Describe how damage ratio arrived at: _____
	Describe (summary): _____	
Across	Damage ratio: 0%	$Damage\_Ratio = \frac{(\%NBS\ (before) - \%NBS\ (after))}{\%NBS\ (before)}$
	Describe (summary): _____	
Diaphragms	Damage?: no	Describe: _____
CSWs:	Damage?: no	Describe: _____
Pounding:	Damage?: no	Describe: _____
Non-structural:	Damage?: yes	Describe: _____

<b>Recommendations</b>	Level of repair/strengthening required: minor non-structural	Describe: _____
	Building Consent required: no	Describe: _____
	Interim occupancy recommendations: full occupancy	Describe: _____
Along	Assessed %NBS before e'quakes: 100%	#### %NBS from IEP below
	Assessed %NBS after e'quakes: 100%	
Across	Assessed %NBS before e'quakes: 73%	#### %NBS from IEP below
	Assessed %NBS after e'quakes: 73%	

If IEP not used, please detail assessment methodology: Equivalent Static



<b>Location</b>		Building Name: Cedar Park Housing Complex Block K	Reviewer: Mary Ann Halliday
Building Address: _____	Unit No: 90	Street: Bristol	CPEng No: 67073
Legal Description: _____			Company: Opus International Consultants
			Company project number: 6-OC327.00
			Company phone number: _____
	Degrees	Min	Sec
GPS south: _____	43	30	49.99
GPS east: _____	172	37	39.00
Building Unique Identifier (CCC): PRO2631			Date of submission: 20-Dec-13
			Inspection Date: 26/10/2013
			Revision: 1
			Is there a full report with this summary? <input checked="" type="checkbox"/> yes

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

<b>Building</b>	No. of storeys above ground: 1	single storey = 1	Ground floor elevation (Absolute) (m): _____
	Ground floor split? no		Ground floor elevation above ground (m): _____
	Storeys below ground: 0		
	Foundation type: strip footings		if Foundation type is other, describe: _____
	Building height (m): 3.00	height from ground to level of uppermost seismic mass (for IEP only) (m): _____	
	Floor footprint area (approx): 68		Date of design: 1992-2004
	Age of Building (years): 12		
	Strengthening present? no		If so, when (year)? _____
	Use (ground floor): multi-unit residential		And what load level (%g)? _____
	Use (upper floors): _____		Brief strengthening description: _____
	Use notes (if required): _____		
	Importance level (to NZS1170.5): IL2		

<b>Gravity Structure</b>	Gravity System: frame system	truss depth, purlin type and cladding _____
	Roof: timber truss	slab thickness (mm) _____
	Floors: concrete flat slab	overall depth x width (mm x mm) _____
	Beams: none	typical dimensions (mm x mm) _____
	Columns: timber	0 _____
	Walls: non-load bearing	

<b>Lateral load resisting structure</b>	Lateral system along: lightweight timber framed walls	<b>Note: Define along and across in detailed report!</b>	note typical wall length (m) _____
	Ductility assumed, μ: 2.00		estimate or calculation? <input checked="" type="checkbox"/> estimated
	Period along: 0.10		estimate or calculation? _____
	Total deflection (ULS) (mm): _____	0.00	estimate or calculation? _____
	maximum interstorey deflection (ULS) (mm): _____		
	Lateral system across: lightweight timber framed walls		note typical wall length (m) _____
	Ductility assumed, μ: 2.00		estimate or calculation? <input checked="" type="checkbox"/> estimated
	Period across: 0.10		estimate or calculation? _____
	Total deflection (ULS) (mm): _____	0.00	estimate or calculation? _____
	maximum interstorey deflection (ULS) (mm): _____		

<b>Separations:</b>	north (mm): _____	leave blank if not relevant
	east (mm): _____	
	south (mm): _____	
	west (mm): _____	

<b>Non-structural elements</b>	Stairs: _____	describe (note cavity if exists) _____
	Wall cladding: brick or tile	describe _____
	Roof Cladding: Metal	
	Glazing: aluminium frames	
	Ceilings: strapped or direct fixed	
	Services(list): _____	

<b>Available documentation</b>	Architectural: partial	original designer name/date _____
	Structural: partial	original designer name/date _____
	Mechanical: none	original designer name/date _____
	Electrical: none	original designer name/date _____
	Geotech report: none	original designer name/date _____

<b>Damage Site:</b>	Site performance: Good	Describe damage: _____
(refer DEE Table 4-2)	Settlement: none observed	notes (if applicable): _____
	Differential settlement: none observed	notes (if applicable): _____
	Liquefaction: _____	notes (if applicable): _____
	Lateral Spread: _____	notes (if applicable): _____
	Differential lateral spread: _____	notes (if applicable): _____
	Ground cracks: _____	notes (if applicable): _____
	Damage to area: _____	notes (if applicable): _____

<b>Building:</b>	Current Placard Status: green	
Along	Damage ratio: 0%	Describe how damage ratio arrived at: _____
	Describe (summary): _____	
Across	Damage ratio: 0%	$Damage\_Ratio = \frac{(\%NBS\ (before) - \%NBS\ (after))}{\%NBS\ (before)}$
	Describe (summary): _____	
Diaphragms	Damage?: no	Describe: _____
CSWs:	Damage?: no	Describe: _____
Pounding:	Damage?: no	Describe: _____
Non-structural:	Damage?: yes	Describe: _____

<b>Recommendations</b>	Level of repair/strengthening required: minor non-structural	Describe: _____
	Building Consent required: no	Describe: _____
	Interim occupancy recommendations: full occupancy	Describe: _____
Along	Assessed %NBS before e'quakes: 100%	#### %NBS from IEP below
	Assessed %NBS after e'quakes: 100%	
Across	Assessed %NBS before e'quakes: 100%	#### %NBS from IEP below
	Assessed %NBS after e'quakes: 100%	

If IEP not used, please detail assessment methodology: Equivalent Static

<b>Location</b>		Building Name: Cedar Park Housing Complex Block L	Unit No: Street	Reviewer: Mary Ann Halliday
Building Address:	90	Bristol	CPEng No: 67073	Company: Opus International Consultants
Legal Description:			Company project number: 6-OC327.00	Company phone number:
	Degrees	Min	Sec	Date of submission: 20-Dec-13
GPS south:	43	30	49.99	Inspection Date: 26/10/2013
GPS east:	172	37	39.00	Revision: 1
Building Unique Identifier (CCC):	PRO2631		Is there a full report with this summary? yes	

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

<b>Building</b>	No. of storeys above ground: 1	single storey = 1	Ground floor elevation (Absolute) (m):
Ground floor split?	no		Ground floor elevation above ground (m):
Storeys below ground:	0		if Foundation type is other, describe:
Foundation type:	strip footings	height from ground to level of uppermost seismic mass (for IEP only) (m):	
Building height (m):	3.00	Date of design:	1992-2004
Floor footprint area (approx):	71		
Age of Building (years):	12		
Strengthening present?	no	If so, when (year)?	
Use (ground floor):	multi-unit residential	And what load level (%g)?	
Use (upper floors):		Brief strengthening description:	
Use notes (if required):			
Importance level (to NZS1170.5):	IL2		

<b>Gravity Structure</b>	Gravity System: frame system	truss depth, purlin type and cladding
Roof: timber truss		slab thickness (mm)
Floors: concrete flat slab		overall depth x width (mm x mm)
Beams: none		typical dimensions (mm x mm)
Columns: timber		0
Walls: non-load bearing		

<b>Lateral load resisting structure</b>	Lateral system along: lightweight timber framed walls	<b>Note: Define along and across in detailed report!</b>	note typical wall length (m)
Ductility assumed, μ:	2.00	0.00	estimate or calculation? estimated
Period along:	0.10		estimate or calculation?
Total deflection (ULS) (mm):			estimate or calculation?
maximum interstorey deflection (ULS) (mm):			
Lateral system across: lightweight timber framed walls		0.00	note typical wall length (m)
Ductility assumed, μ:	2.00		estimate or calculation? estimated
Period across:	0.10		estimate or calculation?
Total deflection (ULS) (mm):			estimate or calculation?
maximum interstorey deflection (ULS) (mm):			

<b>Separations:</b>	north (mm):	leave blank if not relevant
east (mm):		
south (mm):		
west (mm):		

<b>Non-structural elements</b>	Stairs:		describe (note cavity if exists)
Wall cladding: brick or tile			describe
Roof Cladding: Metal			
Glazing: aluminium frames			
Ceilings: strapped or direct fixed			
Services(list):			

<b>Available documentation</b>	Architectural: partial	original designer name/date:
Structural: partial		
Mechanical: none		
Electrical: none		
Geotech report: none		

<b>Damage Site:</b>	Site performance: Good	Describe damage:
(refer DEE Table 4-2)	Settlement: none observed	notes (if applicable):
Differential settlement: none observed		
Liquefaction:		
Lateral Spread:		
Differential lateral spread:		
Ground cracks:		
Damage to area:		

<b>Building:</b>	Current Placard Status: green	
Along	Damage ratio: 0%	Describe how damage ratio arrived at:
Describe (summary):		
Across	Damage ratio: 0%	$Damage\_Ratio = \frac{(\%NBS\ (before) - \%NBS\ (after))}{\%NBS\ (before)}$
Describe (summary):		
Diaphragms	Damage?: no	Describe:
CSWs:	Damage?: no	Describe:
Pounding:	Damage?: no	Describe:
Non-structural:	Damage?: yes	Describe:

<b>Recommendations</b>	Level of repair/strengthening required: minor non-structural	Describe:
Building Consent required: no		Describe:
Interim occupancy recommendations: full occupancy		Describe:
Along	Assessed %NBS before e'quakes: 100%	#### %NBS from IEP below
Assessed %NBS after e'quakes: 100%		If IEP not used, please detail assessment methodology: Equivalent Static
Across	Assessed %NBS before e'quakes: 73%	#### %NBS from IEP below
Assessed %NBS after e'quakes: 73%		

<b>Location</b>		Building Name: Cedar Park Housing Complex Block M	Reviewer: Mary Ann Halliday
Building Address:	Unit No: Street	90 Bristol	CPEng No: 67073
Legal Description:			Company: Opus International Consultants
			Company project number: 6-OC327.00
			Company phone number:
	Degrees Min Sec		Date of submission: 20-Dec-13
GPS south:	43 30 49.99		Inspection Date: 26/10/2013
GPS east:	172 37 39.00		Revision: 1
Building Unique Identifier (CCC): PRO2631			Is there a full report with this summary? yes

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

<b>Building</b>	No. of storeys above ground: 1	single storey = 1	Ground floor elevation (Absolute) (m):
	Ground floor split? no		Ground floor elevation above ground (m):
	Storeys below ground: 0		
	Foundation type: strip footings		if Foundation type is other, describe:
	Building height (m): 3.00	height from ground to level of uppermost seismic mass (for IEP only) (m):	
	Floor footprint area (approx): 170		Date of design: 1992-2004
	Age of Building (years): 12		
	Strengthening present? no		If so, when (year)?
	Use (ground floor): multi-unit residential		And what load level (%g)?
	Use (upper floors):		Brief strengthening description:
	Use notes (if required):		
	Importance level (to NZS1170.5): IL2		

<b>Gravity Structure</b>	Gravity System: frame system	truss depth, purlin type and cladding
	Roof: timber truss	slab thickness (mm)
	Floors: concrete flat slab	overall depth x width (mm x mm)
	Beams: none	typical dimensions (mm x mm)
	Columns: timber	0
	Walls: non-load bearing	

<b>Lateral load resisting structure</b>	Lateral system along: lightweight timber framed walls	<b>Note: Define along and across in detailed report!</b>	note typical wall length (m)
	Ductility assumed, μ: 2.00		estimate or calculation? estimated
	Period along: 0.10		estimate or calculation?
	Total deflection (ULS) (mm):		estimate or calculation?
	maximum interstorey deflection (ULS) (mm):		
	Lateral system across: lightweight timber framed walls		note typical wall length (m)
	Ductility assumed, μ: 2.00		estimate or calculation? estimated
	Period across: 0.10		estimate or calculation?
	Total deflection (ULS) (mm):		estimate or calculation?
	maximum interstorey deflection (ULS) (mm):		

<b>Separations:</b>	north (mm):	leave blank if not relevant
	east (mm):	
	south (mm):	
	west (mm):	

<b>Non-structural elements</b>	Stairs:	describe (note cavity if exists)
	Wall cladding: brick or tile	Weatherboard
	Roof Cladding: Metal	describe
	Glazing: aluminium frames	
	Ceilings: strapped or direct fixed	
	Services(list):	

<b>Available documentation</b>	Architectural: partial	original designer name/date:
	Structural: partial	original designer name/date:
	Mechanical: none	original designer name/date:
	Electrical: none	original designer name/date:
	Geotech report: none	original designer name/date:

<b>Damage Site:</b>	Site performance: Good	Describe damage:
(refer DEE Table 4-2)	Settlement: none observed	notes (if applicable):
	Differential settlement: none observed	notes (if applicable):
	Liquefaction:	notes (if applicable):
	Lateral Spread:	notes (if applicable):
	Differential lateral spread:	notes (if applicable):
	Ground cracks:	notes (if applicable):
	Damage to area:	notes (if applicable):

<b>Building:</b>	Current Placard Status: green	
Along	Damage ratio: 0%	Describe how damage ratio arrived at:
	Describe (summary):	
Across	Damage ratio: 0%	$Damage\_Ratio = \frac{(\%NBS\ (before) - \%NBS\ (after))}{\%NBS\ (before)}$
	Describe (summary):	
Diaphragms	Damage?: no	Describe:
CSWs:	Damage?: no	Describe:
Pounding:	Damage?: no	Describe:
Non-structural:	Damage?: yes	Describe:

<b>Recommendations</b>	Level of repair/strengthening required: minor non-structural	Describe:
	Building Consent required: no	Describe:
	Interim occupancy recommendations: full occupancy	Describe:
Along	Assessed %NBS before e'quakes: 100%	If IEP not used, please detail assessment methodology: Equivalent Static
	Assessed %NBS after e'quakes: 100%	
Across	Assessed %NBS before e'quakes: 81%	If IEP not used, please detail assessment methodology: Equivalent Static
	Assessed %NBS after e'quakes: 81%	

<b>Location</b>		Building Name: Cedar Park Housing Complex Block N	Unit No: Street	Reviewer: Mary Ann Halliday
Building Address:	90	Bristol	CPEng No: 67073	Company: Opus International Consultants
Legal Description:			Company project number: 6-OC327.00	Company phone number:
	Degrees	Min	Sec	Date of submission: 20-Dec-13
GPS south:	43	30	49.99	Inspection Date: 26/10/2013
GPS east:	172	37	39.00	Revision: 1
Building Unique Identifier (CCC): PRO2631				Is there a full report with this summary? yes

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

<b>Building</b>	No. of storeys above ground: 1	single storey = 1	Ground floor elevation (Absolute) (m):
Ground floor split? no			Ground floor elevation above ground (m):
Storeys below ground: 0			
Foundation type: strip footings			if Foundation type is other, describe:
Building height (m): 3.00		height from ground to level of uppermost seismic mass (for IEP only) (m):	
Floor footprint area (approx): 70			Date of design: 1992-2004
Age of Building (years): 12			
Strengthening present? no			If so, when (year)?
Use (ground floor): multi-unit residential			And what load level (%g)?
Use (upper floors):			Brief strengthening description:
Use notes (if required):			
Importance level (to NZS1170.5): IL2			

<b>Gravity Structure</b>	Gravity System: frame system	truss depth, purlin type and cladding
Roof: timber truss		slab thickness (mm)
Floors: concrete flat slab		overall depth x width (mm x mm)
Beams: none		typical dimensions (mm x mm)
Columns: timber		0
Walls: non-load bearing		

<b>Lateral load resisting structure</b>	Lateral system along: lightweight timber framed walls	<b>Note: Define along and across in detailed report!</b>	note typical wall length (m)
Ductility assumed, μ: 2.00	0.00		estimate or calculation? estimated
Period along: 0.10			estimate or calculation?
Total deflection (ULS) (mm):			estimate or calculation?
maximum interstorey deflection (ULS) (mm):			
Lateral system across: lightweight timber framed walls			note typical wall length (m)
Ductility assumed, μ: 2.00	0.00		estimate or calculation? estimated
Period across: 0.10			estimate or calculation?
Total deflection (ULS) (mm):			estimate or calculation?
maximum interstorey deflection (ULS) (mm):			

<b>Separations:</b>	north (mm):	leave blank if not relevant
east (mm):		
south (mm):		
west (mm):		

<b>Non-structural elements</b>	Stairs:		describe (note cavity if exists)
Wall cladding: brick or tile			describe
Roof Cladding: Metal			
Glazing: aluminium frames			
Ceilings: strapped or direct fixed			
Services(list):			

<b>Available documentation</b>	Architectural: partial	original designer name/date:
Structural: partial		
Mechanical: none		
Electrical: none		
Geotech report: none		

<b>Damage Site:</b>	Site performance: Good	Describe damage:
(refer DEE Table 4-2)		
Settlement: none observed		notes (if applicable):
Differential settlement: none observed		notes (if applicable):
Liquefaction:		notes (if applicable):
Lateral Spread:		notes (if applicable):
Differential lateral spread:		notes (if applicable):
Ground cracks:		notes (if applicable):
Damage to area:		notes (if applicable):

<b>Building:</b>	Current Placard Status: green	
Along	Damage ratio: 0%	Describe how damage ratio arrived at:
	Describe (summary):	
Across	Damage ratio: 0%	$Damage\_Ratio = \frac{(\%NBS\ (before) - \%NBS\ (after))}{\%NBS\ (before)}$
	Describe (summary):	
Diaphragms	Damage?: no	Describe:
CSWs:	Damage?: no	Describe:
Pounding:	Damage?: no	Describe:
Non-structural:	Damage?: yes	Describe:

<b>Recommendations</b>	Level of repair/strengthening required: minor non-structural	Describe:
Building Consent required: no		Describe:
Interim occupancy recommendations: full occupancy		Describe:
Along	Assessed %NBS before e'quakes: 100% ##### %NBS from IEP below	If IEP not used, please detail assessment methodology: Equivalent Static
	Assessed %NBS after e'quakes: 100%	
Across	Assessed %NBS before e'quakes: 100% ##### %NBS from IEP below	
	Assessed %NBS after e'quakes: 100%	



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