



Victoria Park – Shed for Fire Appliances  
Qualitative Engineering Evaluation

**Reference:** 228664

**Prepared for:**  
Christchurch City Council

Functional Location ID: PRK\_1829\_BLDG\_012

**Revision:** 2

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**Date:** 11 October 2013

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# Executive Summary

This is a summary of the Qualitative Engineering Evaluation for the Victoria Park – Shed for Fire Appliances building and is based on the Detailed Engineering Evaluation Procedure document issued by the Engineering Advisory Group on 19 July 2011, visual inspections, available structural documentation and summary calculations as appropriate.

<b>Building Details</b>	<b>Name</b>	Victoria Park – Shed for Fire Appliances			
<b>Building Location ID</b>	PRK_1829_BLDG_012	<b>Multiple Building Site</b>	Y		
<b>Building Address</b>	101 Victoria Park Road, Christchurch	<b>No. of residential units</b>	0		
<b>Soil Technical Category</b>	NA	<b>Importance Level</b>	4	<b>Approximate Year Built</b>	2000
<b>Foot Print (m<sup>2</sup>)</b>	130	<b>Stories above ground</b>	1	<b>Stories below ground</b>	0
<b>Type of Construction</b>	Light roof, steel portal framed structure, light profiled metal walls, concrete floor slab on grade				

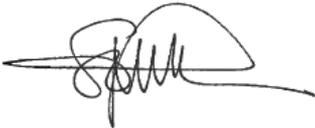
## Qualitative L4 Report Results Summary

<b>Building Occupied</b>	Y	The Victoria Park – Shed for Fire Appliances is currently used as a workshop and storage area for tools and fire engine
<b>Suitable for Continued Occupancy</b>	Y	The Victoria Park – Shed for Fire Appliances is suitable for continued use
<b>Key Damage Summary</b>	Y	Refer to summary of building damage section 3.1 report body
<b>Critical Structural Weaknesses (CSW)</b>	N	There were no critical structural weaknesses found
<b>Levels Survey Results</b>	Y	Floor level survey shows minimal settlements
<b>Building %NBS From IEP</b>	69%	Based on IEP

## Qualitative L4 Report Recommendations

<b>Geotechnical Survey Required</b>	N	Geotechnical survey not required due to lack of observed ground damage on site.
<b>Proceed to L5 Quantitative DEE</b>	N	Quantitative DEE not required for this structure. This report is final.

## Approval

<b>Author Signature</b>		<b>Approver Signature</b>	
<b>Name</b>	Rose So-Beer	<b>Name</b>	Lee Howard
<b>Title</b>	Structural Engineer	<b>Title</b>	Senior Structural Engineer



# 1 Introduction

## 1.1 General

On 27 April 2012 Aurecon engineers visited the Victoria Park – Shed for Fire Appliances 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 Victoria Park – Shed for Fire Appliances 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

Victoria Park – Shed for Fire Appliances is a single storey building with partial exposed mezzanine area. The steel portal frame structure was built in circa 2000. This structure was later extended in 2006 with a galvanised steel portal building (Dangerous Good Store – please refer to PRK 1829 BLDG 010 EQ2 report). The lightweight corrugated metal and clear roof sheeting are supported on timber purlins. The wall cladding is profiled metal sheeting with an additional vertically laid timber slat cladding on the façade of the building. The mezzanine has timber floor construction and plasterboard wall linings. The building has a concrete floor slab on grade and the stanchions of the portal frames are connected at the base to the concrete slab (we assume that there are local thickenings in the slab at these locations).

The approximate floor area of the building is 130 square metres. It is an importance level 4 structure in accordance with NZS 1170 Part 0:2002.

### 2.2 Building Structural Systems Vertical and Horizontal

Vertical loads from the corrugated metal roof sheeting are resisted by timber purlins supported by steel portal frames. The roof bracing and strap bracing in the walls provides lateral restraint and transfer of loads in the longitudinal direction.

The portal frames resist lateral loads in the transverse direction.



## 2.3 Reference Building Type

The Victoria Park – Shed for Fire Appliances is a typical single storey steel portal framed industrial building currently used as a workshop and storage area for tools and fire engine. It has lightweight corrugated metal roof sheeting supported by timber purlins. The external wall claddings are of lightweight profiled metal sheeting.

## 2.4 Building Foundation System and Soil Conditions

The Victoria Park – Shed for Fire Appliances is assumed to be founded on concrete slab with local thickening at portal frame locations.

CERA land zone maps indicate that Victoria Park – Shed for Fire Appliances is zoned Port Hills and Banks Peninsula. The land is deemed unlikely to be susceptible to liquefaction or differential settlement. There are no signs in the vicinity of liquefaction bulges or boils and subsidence and site inspection has shown no obvious ground disturbance or movement noted in the immediate vicinity.

## 2.5 Available Structural Documentation and Inspection Priorities

No architectural or structural drawings were available for the Victoria Park – Shed for Fire Appliances for review. This report is solely based on internal and external visual inspections undertaken on 27 April 2012.

## 2.6 Available Survey Information

Floor level survey has been undertaken and the result shows minimal settlement. No further investigation is required as part of the DEE process.

# 3 Structural Investigation

## 3.1 Summary of Building Damage

The Victoria Park – Shed for Fire Appliances was in use at the time of our internal and external visual damage assessment. It has performed well and there are no significant visible signs of damage that can be attributed to seismic actions.

## 3.2 Record of Intrusive Investigation

There was no sign of significant damage during our visual inspection. Given the lack of internal linings the majority of the primary structural elements could be sighted, an intrusive investigation therefore was neither warranted nor undertaken for Victoria Park – Shed for Fire Appliances.



### 3.3 Damage Discussion

There was no observed damage to the building as a result of seismic actions. This is hardly surprising as buildings of this nature are flexible and have high inherent ductility.

There are minor cracks to the concrete floor slab but these appear to be pre-existing.

The Victoria Park – Shed for Fire Appliances has suffered insignificant damage due to seismic actions and is suitable for continued use as storage.

## 4 Building Review Summary

### 4.1 Building Review Statement

As noted above no intrusive investigations were carried out for the Victoria Park – Shed for Fire Appliances. Because of the generic nature of the building a significant amount of information can be inferred from an external and internal inspection. The greatest uncertainty surrounds the condition of the surrounding land and the extent of building settlement due to recent earthquakes. This will be informed by a building levels survey which was carried out.

### 4.2 Critical Structural Weaknesses

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

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

### 5.1 General

The Victoria Park – Shed for Fire Appliances is a typical steel portal frame building. This type of structure normally performs well and in this particular building there are no significant visible damage that is obviously related to recent earthquakes due to its lightweight metal roof and wall cladding which allows it to be flexible and ductile.

## 5.2 Initial %NBS Assessment

The Victoria Park – Shed for Fire Appliances has been subject to engineering design and the initial evaluation procedure or IEP is an appropriate method of assessment for this building.

Selected assessment seismic parameters are tabulated in the Table below.

Table 1: Parameters used in the Seismic Assessment

Seismic Parameter	Quantity	Comment/Reference
Site Soil Class	D	NZS 1170.5:2004, Clause 3.1.3, Deep or Soft Soil
Site Hazard Factor, $Z$	0.30	DBH Info Sheet on Seismicity Changes (Effective 19 May 2011)
Return period Factor, $R_u$	1.8	NZS 1170.5:2004, Table 3.5
Ductility Factor in Transverse Direction, $\mu$	3	Galvanised steel portal frames
Ductility Factor in Longitudinal Direction, $\mu$	1.25	Galvanised steel grid frames

The seismic capacity for the Victoria Park – Shed for Fire Appliances has been calculated at **69%NBS** (i.e. a 'low risk' building according to NZEE Guidelines).

## 5.3 Results Discussion

The IEP shows that the Victoria Park – Shed for Fire Appliances is capable of achieving seismic performance in line with the current code requirements. This is not surprising as lightweight single story construction like that of Victoria Park – Shed for Fire Appliances produces a low seismic demand.

# 6 Conclusions and Recommendations

The land below the Victoria Park – Shed for Fire Appliances is zoned as Port Hills and Banks Peninsula and as such is not expected to be prone to liquefaction and settlement. Additionally there is no local evidence of settlement and liquefaction in the surrounding land. Floor level survey had been carried out to determine the extent of any differential settlement that may have occurred as a result of seismic shaking and the result shows minimal settlement. Therefore, no further investigation is required.

As there is no clear evidence of any liquefaction or ground movement in the vicinity of the Victoria Park – Shed for Fire Appliances a **geotechnical investigation is currently not considered necessary**.

In our opinion the Victoria Park – Shed for Fire Appliances **is considered suitable for continued use**.



## 7 Explanatory Statement

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

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

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

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

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

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

# Appendices



# Appendix A

## Site Photographs and Levels Survey

27 April 2012 – Victoria Park – Shed for Fire Appliances Site Photographs



Southwest view of the building.



West view of the building.



Internal north side of the building.



Internal south side of the building.



View of the mezzanine on the south end of the building from the ground floor.



View of the mezzanine on the north end of the building from the ground floor.



View of the mezzanine looking towards the northwest corner of the building.



View of the mezzanine looking towards the northeast corner of the building.



View of the north end side of the building from the mezzanine.

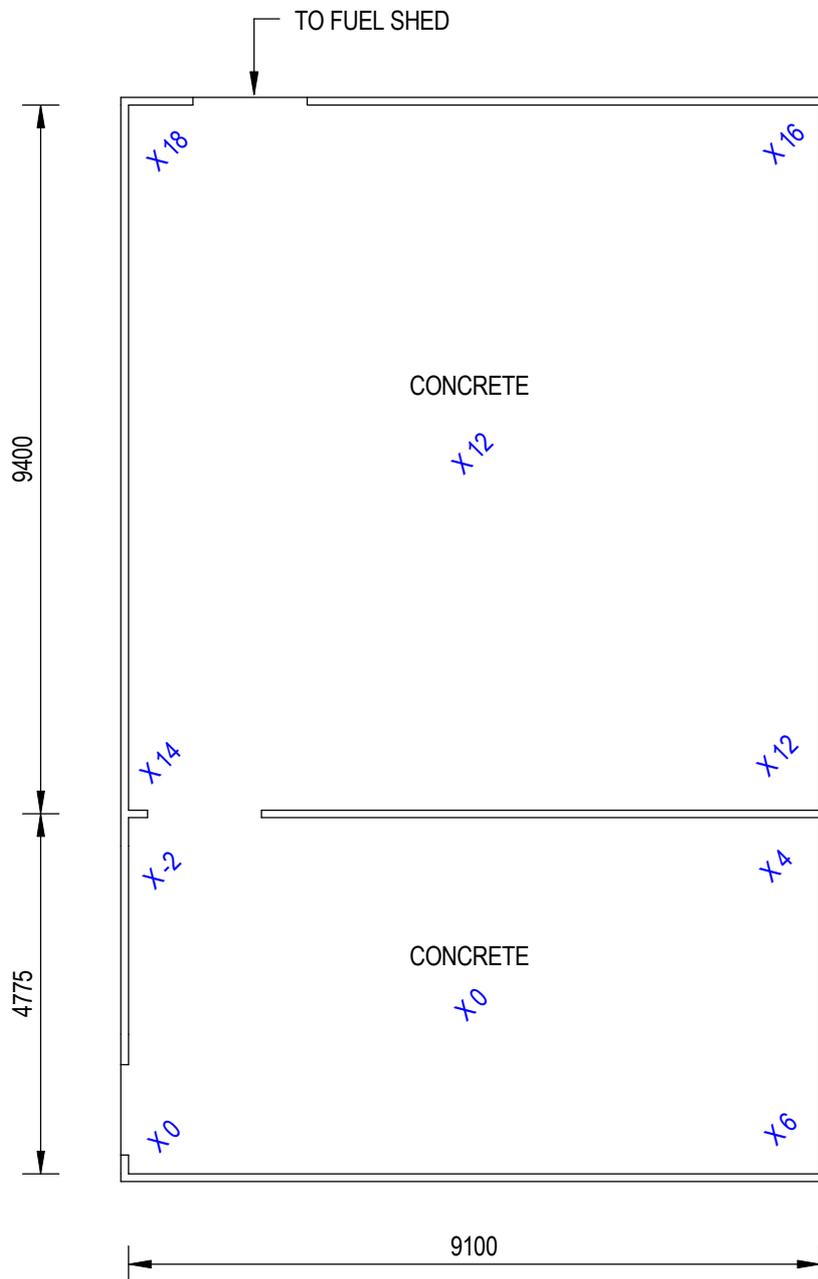


Typical connection detail at ridge.



Typical connection details at knee.





20/02/2013 12:38:29 pm



REV	DATE	REVISION DETAILS	APPROVAL

DRAWN	DESIGNED
D.HUNIA	N/A
CHECKED	
L.CASTILLO	
APPROVED	
	DATE
L.CASTILLO	

PROJECT
VICTORIA PARK SHED FOR FIRE APPLIANCES
TITLE
LEVEL SURVEY

PRELIMINARY NOT FOR CONSTRUCTION	
PROJECT No. 228664	
SCALE 1:100	SIZE A4
DRAWING No. S-01-00	REV



# Appendix B

## References

- Standards New Zealand, “AS/NZS 1170 Parts 0,1 and 5 and commentaries”
- Standards New Zealand, “NZS 3604:2011: Timber Framed Structures”
- Standards New Zealand, “NZS 4229:1999, Concrete Masonry Buildings Not Requiring Specific Design”
- Standards New Zealand, “NZS 3404:1997, Steel Structures Standard”
- Standards New Zealand, “NZS 3101:2006, Concrete Structures Standard”
- New Zealand Society for Earthquake Engineering (NZSEE), “Assessment and Improvement of the Structural Performance of Buildings in Earthquakes June 2006”
- Engineering Advisory Group, “Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-Residential Buildings in Canterbury. Part 2 Evaluation Procedure. Revision 5, 19 July 2011”

# Appendix C

## Strength Assessment Explanation

### New building standard (NBS)

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

### Earthquake Prone Buildings

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

### Christchurch City Council Earthquake Prone Building Policy 2010

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

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

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

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

### Christchurch Seismicity

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

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

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

The New Zealand Society for Earthquake Engineering has proposed a way for classifying earthquake risk for existing buildings in terms of %NBS and this is shown in Figure C1 below.

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

Figure C1: NZSEE Risk Classifications Extracted from table 2.2 of the NZSEE 2006 AISPBE Guidelines

Table C1 below compares the percentage NBS to the relative risk of the building failing in a seismic event with a 10% probability of exceedance in 50 years (i.e. 0.2% in the next year). It is noted that the current seismic risk in Christchurch results in a 6% probability of exceedance in the next year.

Table C1: Relative Risk of Building Failure In A

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

# Appendix D

## Background and Legal Framework

### Background

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

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

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

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

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

### Compliance

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

### Canterbury Earthquake Recovery Authority (CERA)

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

#### **Section 38 – Works**

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

#### **Section 51 – Requiring Structural Survey**

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

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

The qualitative assessment is a desk-top and site inspection assessment. It is based on a thorough visual inspection of the building coupled with a review of available documentation such as drawings and specifications.

The quantitative assessment involves analytical calculation of the buildings strength and may require non-destructive or destructive material testing, geotechnical testing and intrusive investigation.

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

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

## Building Act

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

### Section 112 – Alterations

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

### Section 115 – Change of Use

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

### Section 121 – Dangerous Buildings

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

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

### Section 122 – Earthquake Prone Buildings

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

## Section 124 – Powers of Territorial Authorities

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

## Section 131 – Earthquake Prone Building Policy

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

## Christchurch City Council Policy

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

The 2010 amendment includes the following:

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

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

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

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

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

## Building Code

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

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

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

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

# Appendix E

## Standard Reporting Summary Data Spread Sheet

Detailed Engineering Evaluation Summary Data

V1.11

<b>Location</b>		Building Name: <u>Shed for Fire Appliances</u>	Unit: <u>101</u> Street: <u>Victoria park Road</u>	Reviewer: <u>Lee Howard</u>
Building Address: <u>Victoria Park</u>		Legal Description: <u>RS 41112</u>	Company project number: <u>228664</u>	Company phone number: <u>03 375 0761</u>
GPS south: <u>43</u>	Degrees	Min	Sec	Date of submission: <u>11/10/2013</u>
GPS east: <u>172</u>				Inspection Date: <u>27/04/2012</u>
Building Unique Identifier (CCC): <u>FRK 1829 BLDG_012</u>				Revision: <u>2</u>
				Is there a full report with this summary? <u>yes</u>

<b>Site</b>	Site slope: <u>slope &lt; 1 in 10</u>	Max retaining height (m): <u></u>
	Soil type: <u>mixed</u>	Soil Profile (if available): <u></u>
	Site Class (to NZS1170.5): <u>C</u>	If Ground improvement on site, describe: <u></u>
Proximity to waterway (m, if <100m): <u></u>		
Proximity to cliff top (m, if < 100m): <u></u>		
Proximity to cliff base (m, if <100m): <u></u>		Approx site elevation (m): <u>280.00</u>

<b>Building</b>	No. of storeys above ground: <u>1</u>	single storey = 1	Ground floor elevation (Absolute) (m): <u></u>
	Ground floor split? <u>no</u>		Ground floor elevation above ground (m): <u>280.00</u>
	Storeys below ground: <u></u>		
	Foundation type: <u>isolated pads, no tie beams</u>		if Foundation type is other, describe: <u>assumed</u>
	Building height (m): <u>5.30</u>	height from ground to level of uppermost seismic mass (for IEP only) (m): <u>4.5</u>	
	Floor footprint area (approx): <u>130</u>		
	Age of Building (years): <u>12</u>		Date of design: <u>1992-2004</u>
	Strengthening present? <u>no</u>		If so, when (year)? <u></u>
	Use (ground floor): <u>other (specify)</u>		And what load level (%G)? <u></u>
	Use (upper floors): <u></u>		Brief strengthening description: <u></u>
	Use notes (if required): <u>use as storage and fire engine parking</u>		
	Importance level (to NZS1170.5): <u>IL4</u>		

<b>Gravity Structure</b>	Gravity System: <u>frame system</u>	rafter type, purlin type and cladding: <u>timber purlins</u>
	Roof: <u>steel framed</u>	joist depth and spacing (mm): <u></u>
	Floors: <u>timber</u>	beam and connector type: <u>200PFC and bolts</u>
	Beams: <u>steel non-composite</u>	typical dimensions (mm x mm): <u>200PFC</u>
	Columns: <u>other (note)</u>	
	Walls: <u>non-load bearing</u>	

<b>Lateral load resisting structure</b>	Lateral system along: <u>steel concentric braced frame</u>	<b>Note: Define along and across in detailed report!</b>	note typical frame sizes and bay length (m): <u>9</u>
	Ductility assumed, μ: <u>1.25</u>	0.19 from parameters in sheet	estimate or calculation? <u>estimated</u>
	Period along: <u>0.40</u>		estimate or calculation? <u>estimated</u>
	Total deflection (ULS) (mm): <u></u>		estimate or calculation? <u>estimated</u>
	maximum interstorey deflection (ULS) (mm): <u></u>		
	Lateral system across: <u>welded and bolted steel moment frame</u>	0.00	note typical bay length (m): <u>3.6</u>
	Ductility assumed, μ: <u>3.00</u>		estimate or calculation? <u>estimated</u>
	Period across: <u>0.40</u>		estimate or calculation? <u>estimated</u>
	Total deflection (ULS) (mm): <u></u>		estimate or calculation? <u>estimated</u>
	maximum interstorey deflection (ULS) (mm): <u></u>		

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

<b>Non-structural elements</b>	Stairs: <u>timber</u>	describe supports: <u>100SHS columns</u>
	Wall cladding: <u>profiled metal</u>	describe: <u>profiled metal sheeting</u>
	Roof Cladding: <u>Metal</u>	describe: <u>corrugated metal roof sheeting</u>
	Glazing: <u></u>	
	Ceilings: <u></u>	
	Services (list): <u></u>	

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

<b>Damage</b>	Site performance: <u></u>	Describe damage: <u>minimal damage</u>
Site: (refer DEE Table 4-2)	Settlement: <u>0-25mm</u>	notes (if applicable): <u>see floor level survey sheet</u>
	Differential settlement: <u>none observed</u>	notes (if applicable): <u></u>
	Liquefaction: <u>none apparent</u>	notes (if applicable): <u></u>
	Lateral Spread: <u>none apparent</u>	notes (if applicable): <u></u>
	Differential lateral spread: <u>none apparent</u>	notes (if applicable): <u></u>
	Ground cracks: <u>none apparent</u>	notes (if applicable): <u></u>
	Damage to area: <u></u>	notes (if applicable): <u></u>

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

<b>Recommendations</b>	Level of repair/strengthening required: <u>none</u>	Describe: <u></u>
	Building Consent required: <u>no</u>	Describe: <u></u>
	Interim occupancy recommendations: <u>full occupancy</u>	Describe: <u></u>
Along	Assessed %NBS before e'quakes: <u>69%</u>	69% %NBS from IEP below
	Assessed %NBS after e'quakes: <u>69%</u>	If IEP not used, please detail assessment methodology: <u></u>
Across	Assessed %NBS before e'quakes: <u>91%</u>	91% %NBS from IEP below
	Assessed %NBS after e'quakes: <u>91%</u>	

<b>IEP</b>	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): <u>1992-2004</u>	h <sub>n</sub> from above: <u>4.5m</u>	
Seismic Zone, if designed between 1965 and 1992: <u>B</u>	not required for this age of building Design Soil type from NZS4203:1992, cl 4.6.2.2: <u>C shallow soil</u>	
	along	across
Period (from above): <u>0.4</u>	<u>0.4</u>	<u>0.4</u>
(%NBS)nom from Fig 3.3: <u>24.0%</u>	<u>24.0%</u>	<u>24.0%</u>
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	<u>1.00</u>	<u>1.00</u>
Note 2: for RC buildings designed between 1976-1984, use 1.2	<u>1.0</u>	<u>1.0</u>
Note 3: for buildings designed prior to 1935 use 0.8, except in Wellington (1.0)	<u>1.0</u>	<u>1.0</u>
	along	across
Final (%NBS)nom: <u>24%</u>	<u>24%</u>	<u>24%</u>

2.2 Near Fault Scaling Factor

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

Near Fault scaling factor (1/N(T,D), Factor A:

2.3 Hazard Scaling Factor

Hazard factor Z for site from AS1170.5, Table 3.3:   
 Z<sub>1992</sub>, from NZS4203:1992:   
 Hazard scaling factor, Factor B:

2.4 Return Period Scaling Factor

Building Importance level (from above):   
 Return Period Scaling factor from Table 3.1, Factor C:

2.5 Ductility Scaling Factor

Assessed ductility (less than max in Table 3.2):    
 Ductility scaling factor: =1 from 1976 onwards; or =k<sub>μ</sub>, if pre-1976, from Table 3.3:

Ductility Scaling Factor, Factor D:

2.6 Structural Performance Scaling Factor:

Sp:

Structural Performance Scaling Factor Factor E:

2.7 Baseline %NBS, (NBS%)<sub>b</sub> = (%NBS)<sub>nom</sub> x A x B x C x D x E

%NBS<sub>b</sub>:

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

3.1. Plan Irregularity, factor A:

3.2. Vertical Irregularity, Factor B:

3.3. Short columns, Factor C:

3.4. Pounding potential  
 Pounding effect D1, from Table to right:   
 Height Difference effect D2, from Table to right:

Therefore, Factor D:

3.5. Site Characteristics

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

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

3.6. Other factors, Factor F

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

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

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

3.7. Overall Performance Achievement ratio (PAR)

4.3 PAR x (%NBS)<sub>b</sub>:

PAR x Baseline %NBS:

4.4 Percentage New Building Standard (%NBS), (before)



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