South Brighton Motor Camp – Workshop
Detailed Engineering Evaluation
BU 1359-005 EQ2
Qualitative Report

Prepared for Christchurch City Council

By Beca Carter Hollings & Ferner Ltd (Beca)

14 June 2013

Revision History

Revision Nº	Prepared By	Description	Date
A	Vini Moelianto	Draft for CCC review	13 November 2012
B	Vini Moelianto	Final	14 June 2013

Document Acceptance

Action	Name	Signed	Date
Prepared by	Vini Moelianto		14 June 2013
Reviewed by	Jonathan Barnett		14 June 2013
Approved by	David Whittaker		14 June 2013
on behalf of	Beca Carter Hollings & Ferner Ltd		

South Brighton Motor Camp - Workshop
BU 1359-005 EQ2

Detailed Engineering Evaluation
Qualitative Report – SUMMARY
Revision B

Address
59 Halsey Street
South New Brighton
Christchurch

Background

This is a summary of the Qualitative report for the building structure, and is based on the document 'Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury – Part 2 Evaluation Procedure' (draft) issued by the Engineering Advisory Group (EAG) on 19 July 2011.

The Workshop building is located at 59 Halsey Street, South New Brighton, Christchurch. The building was constructed sometime between 1964 and 1976 according to historic aerial photographs. The building is a timber structure with an approximate floor area of 175m^2 internally. No architectural or structural drawings were available during this assessment. Preliminary wall bracing calculation has been carried out as part of this qualitative assessment.

Key Damage Observed

Visual inspection on 20 June 2012 indicates the building has suffered minor damage to the structure. The key damage observed includes:

- Cracking to slab edge thickening, particularly at the southern end.
- Joint opening of concrete slab on grade likely due to ground settlement and movement caused by earthquake shaking.
- Evidence of ground settlement/movement observed around the perimeter of the building, namely gate at the northern end and at vehicle door openings.

Critical Structural Weaknesses (CSW)

The following potential Critical Structural Weaknesses have been identified:

- Site characteristics, due to widespread liquefaction observed in the surrounding area considered to be severe in this area.

Indicative Building Strength (from Initial Evaluation Procedure and CSW assessment)

The building has been assessed to have a seismic capacity of 43% NBS according to strength assessment conducted on main structural element. The building is therefore classified as Earthquake Risk with Seismic Grade C. No foundation assessment has been carried out.

Recommendations

In order that the owner can make an informed decision about the on-going use and occupancy of their building the following information is presented in line with the Department of Building and Housing document 'Guidance for engineers assessing the seismic performance of non-residential and multi-unit residential buildings in greater Christchurch', June 2012.

The building is considered to be earthquake risk, having an assessed capacity of between 34% and 67%NBS. The risk of collapse of an earthquake risk building is considered to be 5 to 10 times greater than that of an equivalent new building.

No significant damage or hazards were identified to the seismic or gravity load resisting system that would reduce its ability to resist further loads and therefore no restrictions on use or occupancy are recommended.

It is recommended that:

- Further efforts are made to obtain structural drawings.
- A verticality and level survey should be carried out to determine the extent of settlement of the building due to liquefaction for insurance purposes.
- A quantitative %NBS analysis of the building should be completed.
- Repairs that would bring the building back to an "as new" condition are typically entitled under typical replacement insurance policies. We suggest you consult with your insurance advisor as to how you wish to proceed.

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Appendices

1 Background

Beca Carter Hollings & Ferner Ltd (Beca) has been engaged by the Christchurch City Council (CCC) to undertake a qualitative Detailed Engineering Evaluation (DEE) of the South Brighton Motor Camp – Workshop building located at 59 Halsey Street, South New Brighton, Christchurch.

This report is a Qualitative Assessment of the building structure, and is based on the document 'Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury – Part 2 Evaluation Procedure' (draft) issued by the Engineering Advisory Group (EAG) on 19 July 2011.

A qualitative assessment involves inspections of the building, a desktop review of existing structural and geotechnical information, including existing drawings and calculations, if available and an assessment of the level of seismic capacity against current code using the Initial Evaluation Procedure (IEP).

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 has been carried out. Preliminary wall bracing calculation to assess the strength of primary lateral resisting element and its connection has been carried out. The building description below is based on our visual inspection.

The format and content of this report follows a template provided by CCC, which is based on the EAG document.

2 Compliance

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

2.1 Canterbury Earthquake Recovery Authority (CERA)

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

Section 38 – Works

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

Section 51 – Requiring Structural Survey

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

We understand that CERA will require a detailed engineering evaluation to be carried out for all buildings (other than those exempt from the Earthquake Prone Building definition in the Building Act). It is understood that CERA is adopting the Detailed Engineering Evaluation Procedure document (draft) issued by the Engineering Advisory Group on 19 July 2011, which sets out a methodology for both qualitative and quantitative assessments. We understand this report will be used in response to CERA Section 51.

The qualitative assessment includes a thorough visual inspection of the building coupled with a desktop review of available documentation such as drawings, specifications and IEP's. The quantitative assessment involves analytical calculation of the building's 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 that was assigned during the state of emergency following the 22 February 2011 earthquake
- The age and structural type of the building
- Consideration of any Critical Structural Weaknesses
- The extent of any earthquake damage

2.2 Building Act

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

Section 112 – Alterations

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

Section 115 – Change of Use

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

Section 121 – Dangerous Buildings

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

- In the ordinary course of events (excluding the occurrence of an earthquake), the building is likely to cause injury or death or damage to other property; or
- In the event of fire, injury or death to any persons in the building or on other property is likely because of fire hazard or the occupancy of the building; or
- There is a risk that the building could collapse or otherwise cause injury or death as a result of earthquake shaking that is less than a 'moderate earthquake' (refer to Section 122 below); or
- There is a risk that that other property could collapse or otherwise cause injury or death; or

- A territorial authority has not been able to undertake an inspection to determine whether the building is dangerous.

Section 122 – Earthquake Prone Buildings

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

Section 124 – Powers of Territorial Authorities

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

Section 131 – Earthquake Prone Building Policy

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

2.3 Christchurch City Council Policy

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

The 2010 amendment includes the following:

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

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

It is understood that any building with a capacity of less than 33%NBS (including consideration of Critical Structural Weaknesses) will need to be strengthened to a target of 67%NBS of new building standard as recommended by the Policy.

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

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

2.4 Building Code

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

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

a. Hazard Factor increased from 0.22 to 0.3 (36% increase in the basic seismic design load)

b. Serviceability Return Period Factor increased from 0.25 to 0.33 (80% increase in the serviceability design loads when combined with the Hazard Factor increase)

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

3 Earthquake Resistance Standards

For this assessment, the building's Ultimate Limit State 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).

No consideration has been given at this stage to checking the level of compliance against the increased Serviceability Limit State requirements.

The likely ultimate 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 building's capacity based on a comparison of loading codes from when the building was designed and currently. It is a quick high-level procedure that can be used when undertaking a Qualitative analysis of a building. The guidelines also provide guidance on calculating a modified Ultimate Limit State capacity of the building which is much more accurate and can be used when undertaking a Quantitative analysis.

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

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

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

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

Table 3.1: %NBS compared to relative risk of failure

Building Grade	Percentage of New Building Standard (%NBS)	Approx. Risk Relative to a New Building
A+	>100	<1
A	80-100	1-2 times
B	67-80	2-5 times
C	33-67	5-10 times
D	20-33	10-25 times
E	<20	>25 times

4 Building Description

4.1 General

Summary information about the building is given in the following table.

Table 4.1: Building Summary Information

Item	Details	Comment
Building name	South Brighton Motor Camp - Workshop	
Street Address	59 Halsey Street South New Brighton Christchurch	
Age	1964-1976 construction is assumed.	No drawings available, the construction date is assumed between 1964 and 1976 based on the aerial photograph.
Description	Single storey timber construction	
Building Footprint / Floor Area	Approx. 175 m^2 internally	
No. of storeys / basements	1 storey / no basement	
Occupancy / use	Storage and garage	Importance Level 2 assumed
Construction	Timber construction	
Gravity load resisting system	Timber trusses with timber internal and perimeter walls. There are some door openings at the west side of the building.	No drawings available
Seismic load resisting system	Timber walls with continuous diagonal bracings. There is some skylight roof sheeting, however, roof sarking is assumed to be enough to provide roof diaphragm action.	No drawings available
Foundation system	Concrete slab on grade with thickening edge supporting the	No drawings available.

Item	Details	Comment
	timber walls.	
Stair system	Not applicable	
Other notable features	None	
External works		
Construction information	None	No drawings available
Likely design standard	NZSS 1900, Chapter 8:1965	Inferred from assumed age of building.
Heritage status	No heritage status	
Other		

4.2 Structural 'Hot-spots'

- Liquefaction on site influences the concrete slab on grade and edge thickening.
- Timber nailed connection between the primary structural elements.

5 Site Investigations

5.1 Previous Assessments

We have no previous level 1 or 2 assessment for this building. No historical reports or calculations relating to this structure were available.

5.2 Level 4 Damage Inspection

Visual inspection as part of the level 4 damage assessment was undertaken on 20 June 2012.

6 Damage Assessment

6.1 Damage Summary

The table below provides a summary of damage observed during our inspection. Refer to Appendix A for photographs of the observed damage.

Table 6.1: Damage Summary

Damage type	Unknown	Minor	Moderate	Major	Comment
settlement of foundations				✓	10mm cracking to foundation at the south west end indicates there was settlement of the foundation likely due to liquefaction of the ground. Elevation difference using Light Detection and Ranging (LiDAR) from post September 2010 and post December 2010 shows that

Damage type	Unknown	Minor	Moderate	Major	Comment
					the earthquakes caused more than 900 mm settlement in this region.
tilt of building	✓				None observed during visual inspection. Verticality survey may be required to confirm.
liquefaction				✓	The aerial reconnaissance photography from 24th Feb 2011 indicates the extent of liquefaction was major in this area.
settlement of external ground			✓		The unaligned door lock shows the ground move in this region likely due to liquefaction of the ground.
lateral spread / ground cracks	✓				None observed during visual inspection.
Frame damage	✓				No obvious damage observed during visual inspection.
concrete wall damage					Not applicable.
cracking to concrete floors		✓			No significant cracking to concrete floor, however, widened construction joint was approximately 5mm observed during visual inspection.
Bracing damage	✓				No significant damage observed during inspection.
precast flooring seating damage					Not applicable.
Stairs damage					Not applicable.
cladding /envelope damage	✓				No significant damage observed during visual inspection.
internal fit out damage	✓				No significant damage observed to the internal timber wall.
building services damage	✓				No inspections of services were carried out.
other damage					

6.2 Surrounding Buildings

There are no adjacent buildings that are close enough that may affect this building during an earthquake.

6.3 Residual Displacements and General Observations

Some residual displacement and general ground movement was observed during visual inspection. Elevation difference using Light Detection and Ranging (LiDAR) from post September 2010 and post December 2011 shows that the earthquakes caused more than 900mm settlement in this region. Incoming services may have been disturbed or damaged.

6.4 Implication of Damage

The structure has suffered typically minor structural damage and therefore we believe the structural capacity is not significantly diminished from the original. We have assumed that the capacity is reduced by around 5% due to the damage. Intrusive investigation and quantitative analysis would be required to better estimate the structural capacity and the effect of the damage.

7 Generic Issues

The Workshop building is of timber frame construction. None of the generic issues referred to in Appendix A of the EAG guideline document are applicable to the form of timber construction.

8 Critical Structural Weaknesses

8.1 Site Characteristics

Liquefaction occurred on surrounding sites, and was severe.

9 Geotechnical Consideration

No geotechnical information was available for this site. Cracking to foundations and unaligned door lock indicate settlement likely due to earthquake shaking.

10 Survey

There was some evidence of settlement observed during our inspection. We recommend that level and verticality surveys are undertaken to confirm the extent of settlement of the building, as reinstatement of building settlement may be a significant insurance entitlement.

11 Initial Capacity Assessment

11.1 %NBS Assessment

The building has had its seismic capacity assessed using a wall bracing calculation based on the information available. The wall bracing calculation encompasses strength assessment to diagonal bracing and its connection. No foundation assessment has been carried out. The building’s capacity is expressed as a percentage of New Building Standard (%NBS) and is in the order of that shown below in Table 11.1. These capacities are subject to confirmation by a quantitative analysis which is more detailed. The post-damage capacity is considered to be substantially the same as the original capacity.

Table 11.1: Indicative Building Capacities

System	Direction	Seismic Performance in *%NBS*	Notes
Timber wall with continuous diagonal bracing (undamaged state)	Both direction	45%	Wall bracing calculation to assess the strength of diagonal bracing and its connection based on NZS 1170 and NZS 3603:1993. IL 2, Z=0.3.

11.2 Seismic Parameters

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

- Site soil class: D – NZS 1170.5:2004, Clause 3.1.3, Soft Soil
- Site hazard factor, Z = 0.3 – NZBC, Clause B1 Structure, Amendment 11 effective from 19 May 2011
- Return period factor Ru = 1 – NZS 1170.5:2004, Table 3.5, Importance level 2 structure with a 50 year design life.
- Near fault factor N(T,D) = 1 – NZS 1170.5:2004, Clause 3.1.6, Distance more than 20 km from fault line.

11.3 Expected Structural Ductility Factor

The building comprises timber construction with continuous diagonal bracing as the lateral load resisting system. This building is considered as a ductile structure with expected structural ductility of 2.

11.4 Discussion of results

Based on the wall bracing calculation results, the Workshop building is considered Earthquake Risk and seismic grade C as the wall bracing calculation in damaged state result is 43%NBS. This assessment is carried out for the main resisting element and subject to foundation and soil condition. These capacities are subject to confirmation by a quantitative analysis which is more detailed.

12 Initial Conclusions

- The building has been assessed to have a seismic capacity of 43%NBS in damaged state and is therefore Earthquake Risk.
- Critical Structural Weaknesses have been identified as the liquefaction potential at the site.

13 Recommendations

13.1 Occupancy

In order that the owner can make an informed decision about the on-going use and occupancy of their building the following information is presented in line with the Department of Building and Housing document 'Guidance for engineers assessing the seismic performance of non-residential and multi-unit residential buildings in greater Christchurch', June 2012.

The building is considered to be earthquake risk, having an assessed capacity of between 34% and 67%NBS. The risk of collapse of an earthquake risk building is considered to be 5 to 10 times greater than that of an equivalent new building.

No significant damage or hazards were identified to the seismic or gravity load resisting system that would reduce its ability to resist further loads and therefore no restrictions on use or occupancy are recommended.

13.2 Further Investigations, Survey or Geotechnical Work

It is recommended that:

- Further efforts are made to obtain structural or architectural drawings.
- A verticality and level survey should be carried out to determine the extent of settlement of the building due to liquefaction for insurance purposes.
- A quantitative %NBS analysis of the building should be completed.

13.3 Damage Reinstatement

Repairs that would bring the building back to an “as new” condition are typically entitled under typical replacement insurance policies. We suggest you consult with your insurance advisor as to how you wish to proceed.

14 Design Features Report

Repairs will likely be required to reinstate the existing structural system and no additional load paths are expected as a result of the suggested remedial work.

15 Limitations

The following limitations apply to this engagement:

- Beca and its employees and agents are not able to give any warranty or guarantee that all defects, damage, conditions or qualities have been identified.
- Inspections are primarily limited to visible structural components. Appropriate locations for invasive inspection, if required, will be based on damage patterns observed in visible elements, and review of the construction drawings and structural system. As such, there will be concealed structural elements that will not be directly inspected.
- The inspections are limited to building structural components only.
- Inspection of building services, pipework, pavement, and fire safety systems is excluded from the scope of this report.
- Inspection of the glazing system, linings, carpets, claddings, finishes, suspended ceilings, partitions, tenant fit-out, or the general water tightness envelope is excluded from the scope of this report.
- The preliminary assessment of the lateral load capacity of the building is limited by the completeness and accuracy of the drawings provided. Assumptions have been made in respect of the geotechnical conditions at the site and any aspects or material properties not clear on the drawings. Where these assumptions are considered material to the outcome further investigations may be recommended. It is noted the assessment has not been exhaustive, our analysis and calculations have focused on representative areas only to determine the level of provision made. At this stage we have not undertaken any checks of the gravity system, wind load capacity, or foundations.

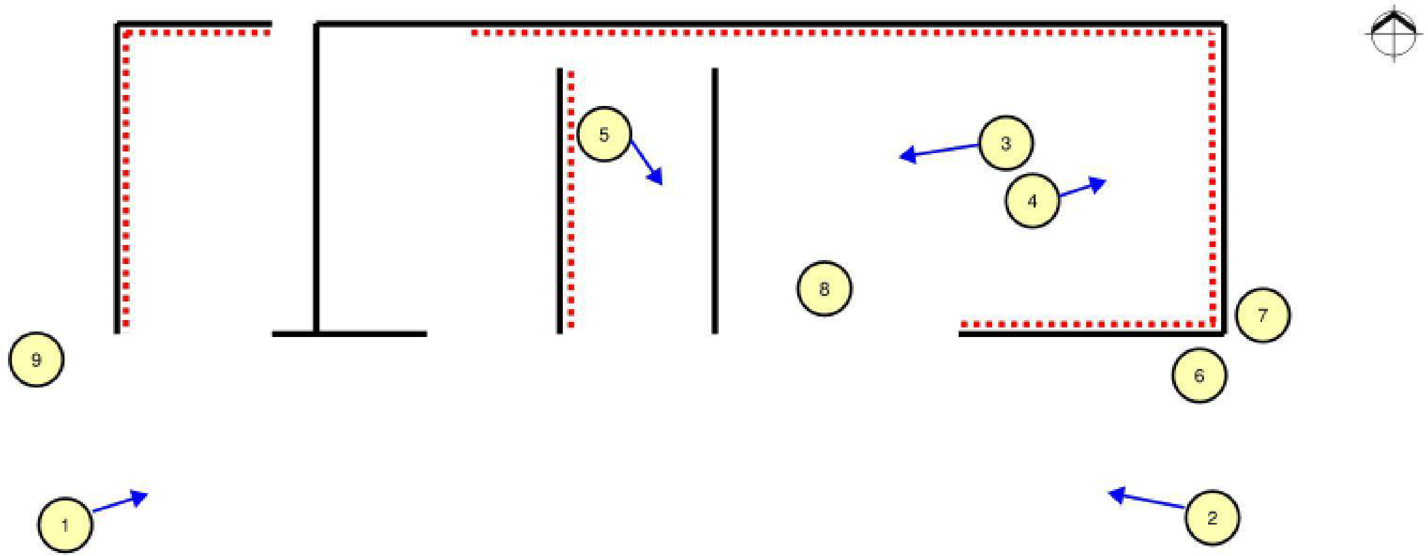
- The information in this report provides a snapshot of building damage at the time the detailed inspection was carried out. Additional inspections required as a result of significant aftershocks are outside the scope of this work.

This report is of defined scope and is for reliance by CCC only, and only for this commission. Beca should be consulted where any question regarding the interpretation or completeness of our inspection or reporting arises.

Appendix A

Photographs

Aerial photograph of site showing the building



CONTINOUS DIAGONAL BRACING

TIMBER FRAME WALL

XX PHOTO REFERENCE NUMBER

PROJECT TITLE:	SOUTH BRIGHTON MOTOR CAMP - WORKSHOP
DRAWING TITLE:	BUILDING MAP

Beca

SK-01

Photo 1: General exterior view of the building from northwest

Photo 2: General exterior view of the building from southwest

Photo 3: General interior view

Photo 4: General interior view

Photo 5: Cracking to foundation

Damage description: Cracking to foundation at the southwest corner of the building with cracking with approximately 10mm.

Photo 6: Cracking to foundation

Damage description: Cracking to foundation at the southwest corner of the building with cracking with approximately 5mm.

Photo 7: Widened construction joint

Damage description: The construction joint of the concrete slab has been widened potentially due to settlement caused by liquefaction.

Photo 8: Ground movement indication

Damage description: the shifting door lock at the northern end of the building indicates the ground settlement/movement.

Appendix B

CERA DEE Summary Data

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Workshop
Building Address:	Unit: ; No: 59; Street: Halsey Street (South Brighton Camping Ground)
Legal Description:	BU 1359-005 EQ2
GPS south: (Degrees / Min / Sec)	
GPS east: (Degrees / Min / Sec)	
Building Unique Identifier (CCC):	
Reviewer:	David Whittaker
CPEng No:	123089
Company:	Beca
Company project number:	5323355
Company phone number:	03 366 3521
Date of submission:	14/06/2013
Inspection Date:	20/06/2012
Revision:	
Is there a full report with this summary?	yes

Site

Site slope:	flat
Soil type:	
Site Class (to NZS1170.5):	D
Proximity to waterway (m, if <100m):	
Proximity to clifftop (m, if < 100m):	
Proximity to cliff base (m,if <100m):	
Max retaining height (m):	
Soil Profile (if available):	Unknown, no geotechnical report available
If Ground improvement on site, describe:	None
Approx site elevation (m):	

Building

No. of storeys above ground:	1 (single storey = 1)
Ground floor split?	no
Storeys below ground	0
Foundation type:	strip footings
Building height (m):	3.50
Floor footprint area (approx):	175
Age of Building (years):	40
Ground floor elevation (Absolute) (m):	
Ground floor elevation above ground (m):	0.00
if Foundation type is other, describe:	Unknown, assumed based on visual inspection
height from ground to level of uppermost seismic mass (for IEP only) (m):	3m eaves and 4m apex
Date of design:	1965-1976
Strengthening present?	no
If so, when (year)?	
And what load level (%g)?	
Brief strengthening description:	
Use (ground floor):	other (specify)
Use (upper floors):	
Use notes (if required):	Storage and garage
Importance level (to NZS1170.5):	IL2

Gravity Structure

Gravity System:	load bearing walls		
Roof:	timber truss	truss depth, purlin type and cladding	Timber purlin
Floors:	concrete flat slab	slab thickness (mm)	Unknown
Beams:	none	overall depth x width (mm x mm)	
Columns:			
Walls:			

Lateral load resisting structure

Note: Define along and across in detailed report!

Lateral system along:	other (note)	describe system	Timber walls with continuous timber bracings
Ductility assumed, μ:	2.00		
Period along:	0.40	0.00 estimate or calculation?	estimated
Total deflection (ULS) (mm):		estimate or calculation?	
maximum interstorey deflection (ULS) (mm):		estimate or calculation?	
Lateral system across:	other (note)	describe system	Timber walls with continuous timber bracings
Ductility assumed, μ:	2.00		
Period across:	0.40	0.00 estimate or calculation?	estimated
Total deflection (ULS) (mm):		estimate or calculation?	
maximum interstorey deflection (ULS) (mm):		estimate or calculation?	

Separations:

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

Non-structural elements

Stairs:	other (specify)	describe	No stair
Wall cladding:	other light	describe	Timber
Roof Cladding:	Metal	describe	
Glazing:	timber frames		
Ceilings:	none		
Services(list):			

Available documentation

		original designer name/date
Architectural	none	
Structural	none	
Mechanical	none	
Electrical	none	
Geotech report	none	

Damage

Site: (refer DEE Table 4-2)

Site performance:	Widespread liquefaction on site	Describe damage:	Ground crack and differential settlement
Settlement:	more than 200mm	notes (if applicable):	Geotechnical report is required to confirm
Differential settlement:	1:250-1:150	notes (if applicable):	Geotechnical report is required to confirm
Liquefaction:	2-5 m²/100m²	notes (if applicable):	Geotechnical report is required to confirm
Lateral Spread:	0-50mm	notes (if applicable):	Geotechnical report is required to confirm
Differential lateral spread:	0-1:400	notes (if applicable):	Geotechnical report is required to confirm
Ground cracks:	0-20mm/20m	notes (if applicable):	Geotechnical report is required to confirm
Damage to area:	moderate to substantial (1 in 5)	notes (if applicable):	Ground crack, settlement potentially due to liquefaction

Building:

Current Placard Status:	green		
Along — Damage ratio:	5%	Describe how damage ratio arrived at:	
Along — Describe (summary):			
Across — Damage ratio:	5%		
Across — Describe (summary):			
Diaphragms — Damage?:	no	Describe:	
CSWs: — Damage?:	yes	Describe:	Liquefaction
Pounding: — Damage?:	no	Describe:	
Non-structural: — Damage?:	no	Describe:	

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

Recommendations

Level of repair/strengthening required:	minor structural	Describe:	
Building Consent required:	yes	Describe:	
Interim occupancy recommendations:	full occupancy	Describe:	
Along — Assessed %NBS before:	45%	0% %NBS from IEP below	If IEP not used, please detail assessment methodology: Hand calculation of brace capacities to main resisting ele
Along — Assessed %NBS after:	43%		
Across — Assessed %NBS before:	45%	0% %NBS from IEP below	
Across — Assessed %NBS after:	43%		

IEP **Use of this method is not mandatory - more detailed analysis may give a different answer, which would take precedence. Do not fill in fields if not using IEP.**

Period of design of building (from above): 1965-1976

h_n from above: 3m eaves and 4m apexm

Seismic Zone, if designed between 1965 and 1992:

not required for this age of building
not required for this age of building

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

Note:1 for specifically design public buildings, to the code of the day: pre-1965 = 1.25; 1965-1976, Zone A =1.33; 1965-1976, Zone B = 1.2; all else 1.0	
Note 2: for RC buildings designed between 1976-1984, use 1.2	
Note 3: for buildngs designed prior to 1935 use 0.8, except in Wellington (1.0)	

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

2.2 Near Fault Scaling Factor

	along	across
Near Fault scaling factor, from NZS1170.5, cl 3.1.6:		1.00
Near Fault scaling factor (1/N(T,D), **Factor A**:	1	1

2.3 Hazard Scaling Factor

Hazard factor Z for site from AS1170.5, Table 3.3:	0.30
Z_{1992}, from NZS4203:1992	1.0
Hazard scaling factor, **Factor B:**	3.333333333

2.4 Return Period Scaling Factor

Building Importance level (from above):	2
Return Period Scaling factor from Table 3.1, **Factor C**:	1.00

2.5 Ductility Scaling Factor

	along	across
Assessed ductility (less than max in Table 3.2)	2.00	2.00
Ductility scaling factor: =1 from 1976 onwards; or =k_μ, if pre-1976, fromTable 3.3:	1.57	1.57
Ductiity Scaling Factor, **Factor D**:	1.57	1.57

2.6 Structural Performance Scaling Factor:

	along	across
Sp:	0.700	0.700
Structural Performance Scaling Factor **Factor E**:	1.428571429	1.428571429

2.7 Baseline %NBS, $(NBS\%)_b = (\%NBS)_{nom}$ x A x B x C x D x E	along	across
$\%NBS_b$:	**0%**	**0%**

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

3.1. Plan Irregularity, factor A:	insignificant	1
3.2. Vertical irregularity, Factor B:	insignificant	1
3.3. Short columns, Factor C:	insignificant	1
3.4. Pounding potential Pounding effect D1, from Table to right		1.0
Height Difference effect D2, from Table to right		1.0
Therefore, Factor D:		1
3.5. Site Characteristics	severe	0.5

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

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

3.6. Other factors, Factor F

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

Detail Critical Structural Weaknesses: (refer to DEE Procedure section 6)
List any: Refer also section 6.3.1 of DEE for discussion of F factor modification for other critical structural weaknesses

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