City Care Milton Street Depot – Store No.3
Detailed Engineering Evaluation
BU 1141-012 EQ2
Quantitative Report

Prepared for Christchurch City Council (Client)

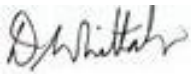
By Beca Carter Hollings & Ferner Ltd (Beca)

30 January 2013

Revision History

Revision Nº	Prepared By	Description	Date
A	Laura Chen	Draft for CCC review	25 January 2013
B	Laura Chen	Final	30 January 2013

Document Acceptance

Action	Name	Signed	Date
Prepared by	Laura Chen		30 January 2013
Reviewed by	Nicholas Charman		30 January 2013
Approved by	David Whittaker		30 January 2013
on behalf of	Beca Carter Hollings & Ferner Ltd		

City Care Milton Street Depot – Store No.3 BU 1141-012 EQ2

Detailed Engineering Evaluation Quantitative Report – SUMMARY
Version 1

Address
245 Milton Street
Sydenham
Christchurch

Background

This is a summary of the Quantitative Assessment 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.

A Qualitative Report for Store No.3 was issued to CCC on 22 June 2012.

Store No.3 is located at the City Care Milton St Depot at 245 Milton Street, Sydenham, Christchurch. It consists of timber purlins on steel truss portal frames with steel roof and wall cross bracing. No architectural or structural drawings were available. Design and construction is estimated to have been early 1990's. Calculations have been undertaken as part of the Quantitative Assessment.

Key Damage Observed

Visual inspection on 1 February 2012 indicates the building has suffered only minor damage. Key damage observed includes:

- Damaged fly braces at the southern end of the building, however these do not appear to be due to the earthquakes.

Critical Structural Weaknesses (CSW)

No Critical Structural Weaknesses have been identified as a result of our quantitative assessment.

Indicative Building Strength (from Detailed Assessment)

The building has been assessed to have a seismic capacity in the order of 6%NBS using the New Zealand Society for Earthquake Engineering (NZSEE) Detailed Assessment guideline 'Assessment and Improvement of the Structural Performance of Buildings in Earthquakes' (AISPBE), 2006, and is therefore classified as Earthquake Prone and Seismic Grade E.

The structural damage observed is minor and the seismic capacity is not considered to have materially diminished from its pre-earthquake condition.

Our assessment has identified the structural components that have governed/limited the building's seismic performance, and their potential failure mechanisms, are as follows:

- Inadequate capacity of the roof bracing connections (6%NBS)
- Compression buckling of the timber strut at the vertical wall bracing (31%NBS)

There are a number of other elements in the building that are considered Earthquake Risk, having assessed seismic capacities greater than 33%NBS and less than 67%NBS.

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 prone, having an assessed capacity less than 33%NBS, and is classified as Seismic Grade E. The risk of collapse of an earthquake prone building of this grade is considered to be more than 25 times greater than that of an equivalent new building.

For greater Christchurch the definition of "dangerous" building in the Building Act has been extended (by the Canterbury Earthquake (Building Act) Order 2011) to include buildings at risk of collapsing in a moderate earthquake, that is earthquake prone buildings with a capacity at or below 33%NBS. Where council requires a dangerous building or an earthquake prone building to be upgraded, it may prohibit the use of the building until the works are carried out.

No significant damage or hazards were identified to the seismic or gravity load resisting system that would further reduce its ability to resist further loads.

It is recommended that:

- A full damage assessment is carried out for insurance purposes.
- A verticality and level survey could be carried out to determine the extent of settlement of the building for insurance purposes.

Table of Contents

Appendices

Appendix A - Photographs

Appendix B - CERA DEE Summary Data

1 Background

Beca Carter Hollings & Ferner Ltd (Beca) has been engaged by Christchurch City Council (CCC) to undertake a Quantitative Detailed Engineering Evaluation (DEE) of Store No.3 building located at the City Care, Milton Street Depot at 245 Milton Street, Sydenham, Christchurch.

This report is a Quantitative 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 quantitative assessment involves analytical calculations of the building's strength and may involve material testing, geotechnical testing and intrusive investigation. The qualitative assessment previously carried out involved 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 these assessments is to determine the likely building performance and damage patterns, to identify any potential Critical Structural Weaknesses (CSW) or collapse hazards, and to make an assessment of the likely building strength in terms of percentage of New Building Standard (%NBS).

The building description below is based on our visual inspections, site measurements and intrusive investigations only, as drawings were not available.

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	City Care Milton Street Depot – Store No.3	
Street Address	245 Milton Street Sydenham Christchurch	
Age	Construction estimated to be post 1992	Construction date is based on a member size used which was not manufactured prior to 1992 (no drawings were available)
Description	Single storey storage shed	
Building Footprint / Floor Area	Approx. 29mx13m with 380m^2 floor area	Approx. 5m to apex
No. of storeys / basements	1 storey / no basement	
Occupancy / use	Storage and meeting space	Importance Level 2
Construction	Metal clad roof and timber purlins on steel trussed portal frames	
Gravity load resisting system	Metal roof sheeting on timber purlins supported by the steel trussed portal frames	No drawings available
Seismic load resisting system	Three bays of steel truss portal frames in the longitudinal direction, and steel cross bracing at the end walls in the transverse direction. The roof diaphragm consists of steel cross bracing.	No drawings available

Item	Details	Comment
Foundation system	Unknown, but likely to be a reinforced concrete slab on grade with shallow foundations	No drawings available
Stair system	None	
Other notable features	None	
External works		
Construction information	None available	
Likely design standard	NZS 4203:1976 or NZS 4203:1992	Inferred from estimated age of the building
Heritage status	No heritage status	
Other		

4.2 Structural 'Hot-spots'

Areas in which damage may be expected to occur from earthquake shaking are outlined below:

- Transverse cross bracing connections.
- Roof cross bracing connections.
- Truss portal frame leg movement due to slenderness of the members.
- End portal frame truss buckling due to lack of fly braces.

5 Site Investigations

5.1 Previous Assessments

It is understood that Opus International Consultants undertook rapid assessments of the buildings on the Milton St Depot site. These reports were not available for review.

Visual inspections as part of the Level 4 damage assessment were undertaken on 1 February 2012. A Qualitative Report was issued to CCC on 22 June 2012.

5.2 Level 5 Intrusive Investigations and Site Measures

As no drawings were available, information used in the Level 5 quantitative assessment were obtained through site measurements of the building. No intrusive investigations were carried out.

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.

Table 6.1: Damage Summary

Damage type	Unknown	Minor	Moderate	Major	Comment
settlement of foundations	✓				None observed during visual inspection. Level survey may be required to confirm
tilt of building	✓				None observed during visual inspection. Verticality survey may be required to confirm
liquefaction					None observed during visual inspection. Contacts on site stated it had occurred in areas throughout the site. The aerial reconnaissance on 24 Feb 2011 indicates the extent was minor.
settlement of external ground					None observed during visual inspection
lateral spread / ground cracks					None observed during visual inspection
frame					No damage was observed during visual inspection
concrete walls					Not Applicable
cracking to concrete floors					No damage was observed during visual inspection
bracing		✓			Two damaged fly braces were observed at the southern end of the building, however these do not appear to be due to the earthquakes
precast flooring seating					Not Applicable
stairs					Not Applicable
cladding /envelope					No damage was observed during visual inspection
internal fit out					No damage was observed during visual inspection
building services	✓				No inspection of services. No obvious damage observed
adjacent buildings					Separation to adjacent buildings are greater than 1m and are not a threat to this structure
other					

6.2 Surrounding Buildings

There are no adjacent buildings which are close enough that they may affect this structure during an earthquake.

6.3 Residual Displacements and General Observations

No evidence of permanent displacement was observed during the visual inspection. A global settlement survey may reveal movement that could be described as damage under insurance entitlement.

6.4 Implication of Damage

We believe that the damage observed to this building is not considered to pose a hazard in its current condition and the structural capacity of the structure has not been significantly affected.

7 Generic Issues

The following generic issues referred to in Appendix A of the EAG guideline document have been identified as applicable to Store No.3.

- Connections inadequate for capacity of braces.
- Inadequate stiffness of the structure as a whole meaning that the building exceeds drift limits.

However, only minor damage has been observed.

8 Geotechnical Consideration

No Geotechnical information is currently available for this site.

During the inspection, any damage to the surrounding ground was noted and any effect to the structure was considered.

9 Survey

No level or verticality surveys were carried out as there was no evidence of settlement or displacement observed during the inspection. CCC may wish to undertake a level survey as part of insurance entitlement considerations.

10 Detailed Seismic Capacity Assessment

10.1 Assessment Methodology

The building has had its seismic capacity assessed using the Detailed Assessment Procedures in the NZSEE 2006 AISPBE guidelines and based on the site measurements undertaken.

The structure has suffered minor damage. The post-damage capacity is considered to be the same as the original capacity.

10.2 Assumptions

The following assumptions were used in our quantitative assessment:

- Structural steel yield strength, fy = 250MPa
- Timber compressive (parallel) strength, fc = 20.9MPa
- Grade 4.6/S HD bolts at base connections, grade 8.8/S bolts elsewhere (as indicated from visual inspection)
- Truss chord member size of 48.3x3.2 CHS

10.3 Critical Structural Weaknesses

The following Critical Structural Weakness was identified in the Qualitative Report:

- Site characteristics, due to liquefaction occurring on the Milton St site.

The site characteristics were assessed by applying a differential settlement to one of the columns of the portal frames. The amount of settlement applied was derived from the EAG guidelines. The site characteristics are no longer considered a Critical Structural Weakness.

10.4 Seismic Parameters

The seismic design parameters based on current design requirements from NZS 1170.5:2004 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.

10.5 Results of Seismic Assessment

The results of our quantitative assessment indicate the building has a seismic capacity in the order of 6%NBS. This is significantly lower than the IEP assessment of 40%NBS in the previous Qualitative Report. Table 10.1 presents the evaluated seismic capacity in terms of %NBS of the individual structural systems in each building direction.

Table 10.1: Summary of Seismic Assessment of Structural Systems

Item	Direction	Ductility, μ	Seismic Performance	Notes
Overall %NBS adopted from DEE	**Both**	**1.25**	**6%NBS**	**Governed by bending capacity of plates in the roof bracing connection**
Portal frame truss	Longitudinal	1.25	37%NBS	Governed by compression capacity of bottom chord
Portal frame columns	Longitudinal	1.25	53%NBS	Governed by bending capacity
Truss to column connection	Longitudinal	1.25	69%NBS	Governed by bending capacity of plates
Base connection of portal frames	Longitudinal	1.25	>100%NBS	
Roof bracing	Both	1.25	6%NBS	Governed by bending capacity of plates
Wall bracing	Transverse	1.25	31%NBS	Governed by compression capacity of timber strut
Base connection at braced bays	Transverse	1.25	49%NBS	Governed by combined tension and shear capacity of bolt connection

Note: Ductility factors are in accordance with values recommended in the NZSEE 2006 AISPBE guidelines.

10.6 Discussion of results

Based on the results of our Quantitative Assessment, Store No. 3 is considered Earthquake Prone and Seismic Grade E as the seismic capacity was assessed to be less than 33%NBS.

The key findings of the assessment are as follows:

- Inadequate capacity of the roof bracing connections (6%NBS)
- Compression buckling of the timber strut at the vertical wall bracing (31%NBS)

There are a number of other elements in the building that are considered Earthquake Risk, having assessed seismic capacities greater than 33%NBS and less than 67%NBS.

11 Recommendations

11.1 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 prone, having an assessed capacity less than 33%NBS, and is classified as Seismic Grade E. The risk of collapse of an earthquake prone

building of this grade is considered to be more than 25 times greater than that of an equivalent new building.

For greater Christchurch the definition of “dangerous” building in the Building Act has been extended (by the Canterbury Earthquake (Building Act) Order 2011) to include buildings at risk of collapsing in a moderate earthquake, that is earthquake prone buildings with a capacity at or below 33%NBS. Where council requires a dangerous building or an earthquake prone building to be upgraded, it may prohibit the use of the building until the works are carried out.

No significant damage or hazards were identified to the seismic or gravity load resisting system that would further reduce its ability to resist further loads.

11.2 Further Investigations, Survey or Geotechnical Work

It is recommended that:

- A full damage assessment is carried out for insurance purposes.
- A verticality and level survey could be carried out to determine the extent of settlement of the building for insurance purposes.

11.3 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.

12 Design Features Report

A repair methodology has not been prepared at this stage. No new load paths are expected as a result of the repairs required.

13 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 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

Figure A1: Site Plan (North is to the left of page)

Photo 1: Exterior view

Photo 2: Interior view

Photo 4: Damaged fly brace

Damage Description: Damaged fly brace at the southern end of the building

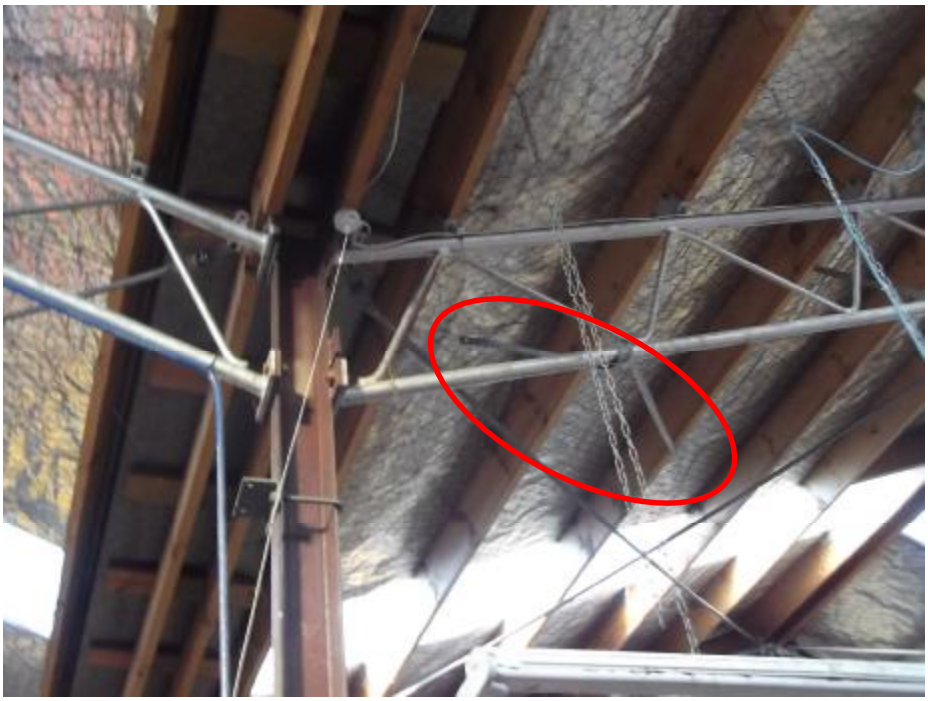


Photo 5: Damaged fly brace

Damage Description: Damaged fly brace at the southern end of the building

Photo 6: Roof bracing connection

Appendix B

CERA DEE Summary Data

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Milton St Depot - Store No3			Reviewer:	David Whittaker
	Unit	No:	Street	CPEng No:	123089
Building Address:		245	Milton Street	Company:	Beca
Legal Description:				Company project number:	5323355
				Company phone number:	03 3663521
	Degrees	Min	Sec		
GPS south:				Date of submission:	
GPS east:				Inspection Date:	1/02/2012
				Revision:	
Building Unique Identifier (CCC):	BU 1411-012 EQ2			Is there a full report with this summary?	yes

Site

Site slope:	flat	Max retaining height (m):	0
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 cliftop (m, if < 100m):			
Proximity to cliff base (m,if <100m):		Approx site elevation (m):	

Building

No. of storeys above ground:	1	single storey = 1	Ground floor elevation (Absolute) (m):	
Ground floor split?	no		Ground floor elevation above ground (m):	0.00
Storeys below ground	0			
Foundation type:	pads with tie beams		if Foundation type is other, describe:	
Building height (m):	6.50	height from ground to level of uppermost seismic mass (for IEP only) (m):		
Floor footprint area (approx):	380			
Age of Building (years):			Date of design:	1992-2004
Strengthening present?	no		If so, when (year)?	
			And what load level (%g)?	
Use (ground floor):	other (specify)		Brief strengthening description:	
Use (upper floors):				
Use notes (if required):	Storage			
Importance level (to NZS1170.5):	IL2			

Gravity Structure

Gravity System:	frame system		
Roof:	steel truss	truss depth, purlin type and cladding	
Floors:			
Beams:			
Columns:	structural steel	typical dimensions (mm x mm)	
Walls:	non-load bearing	0	

Lateral load resisting structure

Lateral system along:	welded and bolted steel moment frame	**Note: Define along and across in detailed report!**	note typical bay length (m)	steel truss portal frame
Ductility assumed, μ:	1.25			
Period along:	0.40	0.00	estimate or calculation?	estimated
Total deflection (ULS) (mm):			estimate or calculation?	
maximum interstorey deflection (ULS) (mm):			estimate or calculation?	
Lateral system across:	steel concentric braced frame		note typical frame sizes and bay length (m)	steel cross bracing
Ductility assumed, μ:	1.25			
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	none
Wall cladding:	profiled metal	describe	
Roof Cladding:	Metal	describe	
Glazing:	other (specify)		none
Ceilings:	none		
Services(list):			

Available documentation

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

Damage

Site:

(refer DEE Table 4-2)	Site performance:	Good	Describe damage:
	Settlement:	none observed	notes (if applicable):
	Differential settlement:	none observed	notes (if applicable):
	Liquefaction:	none apparent	notes (if applicable):
	Lateral Spread:	none apparent	notes (if applicable):
	Differential lateral spread:	none apparent	notes (if applicable):
	Ground cracks:	0-20mm/20m	notes (if applicable):
	Damage to area:	slight	notes (if applicable):

Building:

	Current Placard Status:	green		
Along	Damage ratio:	0%	Describe how damage ratio arrived at:	
	Describe (summary):			
Across	Damage ratio:	0%		
	Describe (summary):			
Diaphragms	Damage?:	no	Describe:	
CSWs:	Damage?:	no	Describe:	
Pounding:	Damage?:	no	Describe:	N/A
Non-structural:	Damage?:	no	Describe:	

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

Recommendations

	Level of repair/strengthening required:	none		Describe:	
	Building Consent required:	no		Describe:	
	Interim occupancy recommendations:	full occupancy		Describe:	
Along	Assessed %NBS before:	27%	##### %NBS from IEP below	If IEP not used, please detail assessment methodology:	Forced-based quantitative assessment
	Assessed %NBS after:	27%			
Across	Assessed %NBS before:	31%	##### %NBS from IEP below		
	Assessed %NBS after:	31%			

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): 1992-2004 — h_n from above: m

Seismic Zone, if designed between 1965 and 1992: — not required for this age of building — Design Soil type from NZS4203:1992, cl 4.6.2.2:

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

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

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

2.2 Near Fault Scaling Factor — Near Fault scaling factor, from NZS1170.5, cl 3.1.6:

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

2.3 Hazard Scaling Factor — Hazard factor Z for site from AS1170.5, Table 3.3:
Z_{1992}, from NZS4203:1992
Hazard scaling factor, **Factor B:** #DIV/0!

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

	along	across
2.5 Ductility Scaling Factor — Assessed ductility (less than max in Table 3.2)		
Ductility scaling factor: =1 from 1976 onwards; or =k_μ, if pre-1976, fromTable 3.3:		
Ductility Scaling Factor, **Factor D**:	1.00	1.00

2.6 Structural Performance Scaling Factor: Sp:

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

2.7 Baseline %NBS, $(NBS\%)_b$ = $(\%NBS)_{nom}$ x A x B x C x D x E — **$\%NBS_b$:** #DIV/0! | #DIV/0!

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

3.1. Plan Irregularity, factor A:		1
3.2. Vertical irregularity, Factor B:		1
3.3. Short columns, Factor C:		1
3.4. Pounding potential — Pounding effect D1, from Table to right		
Height Difference effect D2, from Table to right		
Therefore, Factor D:		0
3.5. Site Characteristics		1

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

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

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

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

3.7. Overall Performance Achievement ratio (PAR) — **0.00** | **0.00**

4.3 PAR x (%NBS)b: — PAR x Baseline %NBS: **#DIV/0!** | **#DIV/0!**

4.4 Percentage New Building Standard (%NBS), (before) — **#DIV/0!**

Official Use only:
Accepted By:
Date: