Project: Sockburn Creche

Qualitative Engineering Evaluation

Prepared for: Christchurch City Council

Project: 228364

Date: 15 October 2013

Building Functional Location ID : PRO_1565_B002

Building Name : Sockburn Creche

Building Address : 10 Weaver Place

Document Control Record

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Document control						
Report Title		Qualitative Engineering Evaluation				
Document ID		PRO_1565_B002	**Project Number**		228364	
File Path		\\aurecon\shares\NZCHC\Projects\227725				
Client		Christchurch City Council	**Client Contact**		Michael Sheffield	
Rev	**Date**	**Revision Details/Status**	**Prepared by**	**Author**	**Verifier**	**Approver**
1	**23 April 2012**	Preliminary	SKM	SKM	FML	FML
2	**15 October 2013**	Final	SKM	SKM	FML	FML
Current Revision		**2**				

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

Contents

1. Executive Summary

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

Building Details	**Name**	Sockburn Creche		**Building Location ID:**	PRO_1565_B002
Building Address	10 Weaver Place				
Foot Print m^2	200	**Stories above ground**	1	**Stories below ground**	0
Approximate Year Built	1997	**Building Age Years**	16	**Number of res. units**	0
Building Current Use	Early Childhood Education				
Type of Construction	Light roof, light timber frame suspended timber floor building.				

Qualitative L4 Report Results Summary		
Building Occupied	Y	Currently used by Springs Community Early Learning Centre.
Suitable for Continued Occupancy	Y	Assessed as suitable for continued occupation.
Critical Structural Weaknesses	N	No critical weaknesses were found.
Building %NBS From Analysis	46%	Based on braced walls calculations.
Key Damage Summary	Y	Refer to summary of building damage section 4.1 report body.

Qualitative L4 Report Recommendations		
Levels Survey Required	N	TC1 Land and no evidence of settlement.
Geotechnical Survey Required	N	TC1 land and no evidence of settlement.
Multiple Structure Site	N	
Proceed Directly To L5 Quantitative DEE	Y	Quantitative report required for any consentable repairs

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

2. Introduction

2.1 General

On 02 March 2012 Aurecon engineers visited the Sockburn Creche 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; and
- 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 Sockburn Creche at 10 Weaver Place 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.

3. Description of the Building

3.1 Building Age and Configuration

Sockburn Creche is 200 square meters in area, has a light roof, light timber framed walls and is a single storey building on timber piles. Available plans indicate that it was constructed as two separate buildings, probably off site, transported to the site and the two parts positioned on site side by side. For both buildings there are significantly more walls available to resist lateral loads at the southern end. Additionally the ceiling diaphragm for Building A terminates 6.0m short of the north end of the building. The building is considered to be an importance level 2 structure and is currently used by the Springs Community Early Learning Centre.

3.2 Building Structural Systems Vertical and Horizontal

Plans were available and these were reviewed as part of the investigation. Lateral loads are resisted by plaster board lined timber framed walls. Vertical gravity loads are carried first by pre-nailed timber trusses spanning onto timber frame walls. The timber framed walls transfer load via timber bearers into 150SED H5 treated round timber foundation piles.

3.3 Reference Building Type

This is a typical lightweight timber framed structure with light cladding and of standard construction similar to many residential dwellings. It is of recent construction and has been purpose designed with an open plan style to suit its use. It is a common type of building that typically performs well when correctly designed, proportioned and detailed as this building appears to be.

3.4 Building Foundation System and Soil Conditions

The building has a timber floor supported on 150SED round timber piles. These are notched to support a bearer fixed to the pile by means of a galvanised bolt. The soil in this area is categorised as technical category 1 (TC1) meaning that future land damage from liquefaction is unlikely.

3.5 Available Structural Documentation and Inspection Priorities

Original consent drawings and alteration consent drawings were available and a drawing review was carried out. The main potential issue highlighted by the drawings was the lateral capacity of the bracing walls.

3.6 Available Survey Information

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

4. Structural Investigation

4.1 Summary of Building Damage

The building is currently in use and was occupied at the time of the damage assessment. In general damage noted was of a minor nature and included the following;

- Extensive minor cracking to gypsum walls particularly in corners at openings.
- Extensive minor cracking to ceilings particularly at the wall ceiling intersections.

Building consent records indicate that in the year 2000 a small addition to the south west corner of the building was constructed. An image of the plans is attached in Appendix A. It was noted on site that the floor for this area was very soft and that there was a noticeable step between the original floor and the addition. Subfloor framing in this was visible and it appears that the floor joists for the addition are inadequately supported and have come loose due to the earthquakes.

Sockburn Creche staff noted that since the September 2010 earthquake leaks have occurred in the roof on the ridgeline at the northern end of the intersection between the two parts of the building.

4.2 Record of Intrusive Investigation

As noted above generally damage was of a minor nature. Additionally due to the generic nature of the buildings and the minor nature of most of the damage it can be inferred that significant hidden damage is unlikely. Other damage such as the sagging floor at the south west corner could be directly viewed and was informed by the available drawings.

4.3 Damage Discussion

Some of the damage to the Sockburn Crèche is related to the fact that it has been constructed by placing two structurally independent buildings together on site. Roof leaks may be due to damage to the flashing between the two buildings. This may have been caused by the discontinuity in the ceiling diaphragms for the buildings allowing them to move independently resulting in excessive deformation to the flashing.

Minor cracking to the gypsum wall board linings is not considered significant and will not greatly reduce the buildings capacity to resist lateral loads.

The subfloor area for the majority of the structure was not accessible however it was possible to view the piles and pile bearer connections in some locations. In general the subfloor structure appears robust and exhibits no sign of excessive stress or deformation.

The partial failure of support for the floor for the addition in the southwest corner of the building, in addition to the earthquakes, is due to poor structural documentation and poor construction. It appears that the joists for the addition have relied on the existing structure for support and yet the connection to the structure was not specified. Inadequate support installed by the builders has failed allowing the floor to sag.

5. Building Review Summary

5.1 Building Review Statement

Although much of the primary structure of this building was covered by linings it was inferred that because damage to linings was of a minor nature significant hidden damage was unlikely. Where significant damage was present, such as support to the floor in the south west corner, the primary structure was visible.

5.2 Critical Structural Weaknesses

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

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

6.1 General

As noted above the Sockburn Creche is a single story, lightweight timber structure with simple and well defined load paths. This is a building type and configuration that can be resilient and appears to have performed well during the Canterbury Earthquakes to date. The building has a ductile failure mechanism laterally where loads are resisted by gypsum lined timber walls. Loads are transferred to the walls from the roof by the ceiling diaphragm. This mechanism is somewhat inhibited by the fact that the ceiling diaphragm for Building A does not extend its full length.

Below floor level lateral loads are resisted by 150SED H5 cantilever round timber piles. As noted above the subfloor structure appears robust and exhibits no sign of excessive stress or deformation.

6.2 Structure %NBS Assessment

The Sockburn Community Creche has been constructed in two parts that are essentially separate structurally. Its lateral load capacity has been evaluated in this way also. The two parts of the structure are called Building A and Building B. A plan identifying the buildings is attached in appendix A. Building A is the larger part of the Creche and has an estimated lateral load capacity of 90%NBS transversely and >100%NBS longitudinally. The smaller part, Building B, has an estimated lateral load capacity of 46%NBS transversely and 85%NBS longitudinally.

6.3 Results Discussion

The low calculated transverse percentage NBS for Building B is somewhat surprising given the observed damage is minor and although it means the building as a whole must be considered a moderate risk structure this does not indicate that the building is unsafe. The results for Building A were much better with a minimum estimated lateral load capacity of 90%NBS transversely. If the buildings were considered a single structure the higher rating for Building A would have the effect of increasing the overall capacity of the structure to above 67%NBS however given that the strength of the connections between the structures is uncertain it is appropriate to consider them separately.

Considering the two buildings separately is a conservative approach. Even without a formal diaphragm connection the stronger building will tend to provide some support to the weaker structure. The estimated percentage new building strength for Building B is 46%NBS and as such is in the middle of the range of values considered to be moderate risk. Nevertheless this structure exhibits only minor damage, is of a ductile structural type and even under severe overstress is unlikely to completely collapse.

7. Conclusions and Recommendations

Although the calculated %NBS for Building B is 46%NBS this part of the structure exhibits only minor damage, is of a ductile structural type and even under severe overstress is unlikely to completely collapse. Accordingly this part of the structure and the building as a whole is considered suitable for continued occupancy.

The ceiling diaphragm for Building A terminates 6.0m short of the northern end of the structure. It is recommended that, as part of any strengthening measures, the ceiling diaphragm is extended the full length of the building.

Damage and loss of support to the floor of the addition in the south west corner of the building has occurred. It is recommended that a new bearer and new piles are installed to reinstate support and bring the floor back to level.

The land below the Sockburn Creche is zoned TC1 and as such has been identified as land that is unlikely to have future damage from liquefaction. Accordingly it is expected that a geotechnical investigation is not required.

8. 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, we have obtained existing building drawings from the Christchurch City Council records where available. Where drawings have been made available 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

Photos and Scans

Aerial Photo Taken February 2011 Post Earthquake

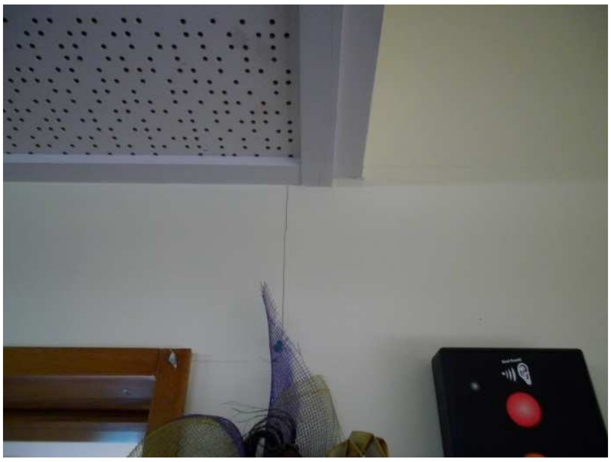
Site photographs (31 January 2012)

South Elevation.

East Elevation.

Crack adjacent to door opening in office.

Sagging floor structure below office at south end.



Vertical crack in wall at end of ceiling diaphragm Building A

Appendix B

Reference Documents and Material

1. Standards New Zealand, "AS/NZS 1170 Part 0, Structural Design Actions: General Principles", 2002

2. Standards New Zealand, "AS/NZS 1170 Part 1, Structural Design Actions: Permanent, imposed and other actions", 2002

3. Standards New Zealand, "NZS 1170 Part 5, Structural Design Actions: Earthquake Actions – New Zealand", 2004

4. New Zealand Society for Earthquake Engineering (NZSEE) 2006 Study Group Recommendations "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes" – June 2006

5. Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-Residential Buildings in Canterbury. Part 2 Evaluation Procedure. Draft prepared by Engineering Advisory Group, Revision 5, 19 July 2011.

Appendix C
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 22nd February 2011 earthquake the zone factor for Christchurch was 0.22. Following the earthquake the seismic zone factor (level of seismicity) in the Christchurch and surrounding areas has been increased to 0.3. This is a 36% increase.

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

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

1 Background

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

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

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

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

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

2 Compliance

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

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

Section 38 – Works

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

Section 51 – Requiring Structural Survey

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

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

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

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

It is anticipated that factors determining the extent of evaluation and strengthening level required will include:
- The importance level and occupancy of the building
- The placard status and amount of damage
- The age and structural type of the building
- Consideration of any critical structural weaknesses
- The extent of any earthquake damage

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

Section 112 – Alterations

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

Section 115 – Change of Use

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

2.2.1 Section 121 – Dangerous Buildings
The definition of dangerous building in the Act was extended by the Canterbury Earthquake (Building Act) Order 2010, and it now defines a building as dangerous if:

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

Section 122 – Earthquake Prone Buildings

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

Section 124 – Powers of Territorial Authorities

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

Section 131 – Earthquake Prone Building Policy

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

2.3 Christchurch City Council Policy

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

The 2010 amendment includes the following:

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

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

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

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

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

2.4 Building Code

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

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

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

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

Appendix E

Standard Reporting Spread Sheet

Detailed Engineering Evaluation Summary Data V1.11

Location

- Building Name: Sockburn Creche
- Unit / No: / Street
- Building Address: 10 | Weaver Place, Sockburn
- Legal Description:
- Degrees / Min / Sec
- GPS south:
- GPS east:
- Building Unique Identifier (CCC): PRO_1565_B002
- Reviewer: Simon Manning
- CPEng No: 132053
- Company: Aurecon
- Company project number: 227052
- Company phone number: 03 375 0761
- Date of submission: 15/10/2013
- Inspection Date: 2/03/2012
- Revision: 2
- Is there a full report with this summary? yes

Site

- Site slope: flat
- Soil type: mixed
- 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):
- If Ground improvement on site, describe:
- Approx site elevation (m): 21.00

Building

- No. of storeys above ground: 1 (single storey = 1)
- Ground floor split? no
- Storeys below ground
- Foundation type: timber piles
- Building height (m): 4.00
- Floor footprint area (approx): 200
- Age of Building (years): 16
- Ground floor elevation (Absolute) (m): 0.60
- Ground floor elevation above ground (m): 21.60
- if Foundation type is other, describe:
- height from ground to level of uppermost seismic mass (for IEP only) (m): 5
- Date of design: 2004-
- Strengthening present? no
- If so, when (year)?
- And what load level (%g)?
- Brief strengthening description:
- Use (ground floor): educational
- Use (upper floors):
- Use notes (if required): Earlychildhood Centre
- Importance level (to NZS1170.5): IL2

Gravity Structure

- Gravity System: load bearing walls
- Roof: timber framed
- Floors:
- Beams:
- Columns:
- Walls:
- rafter type, purlin type and cladding: Light metal roof on timber framing

Lateral load resisting structure

Note: Define along and across in detailed report!

- Lateral system along: lightweight timber framed walls
- note typical wall length (m):
- Ductility assumed, μ: 3.00
- Period along: 0.40 | 0.00 | estimate or calculation? estimated
- Total deflection (ULS) (mm): 35 | estimate or calculation? estimated
- maximum interstorey deflection (ULS) (mm): 35 | estimate or calculation? estimated
- Lateral system across: lightweight timber framed walls
- note typical wall length (m):
- Ductility assumed, μ: 3.00
- Period across: 0.40 | 0.00 | estimate or calculation? estimated
- Total deflection (ULS) (mm): 35 | estimate or calculation? estimated
- maximum interstorey deflection (ULS) (mm): 35 | estimate or calculation? estimated

Separations:

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

Non-structural elements

- Stairs:
- Wall cladding:
- Roof Cladding: Metal
- Glazing: aluminium frames
- Ceilings: light tiles
- Services(list):
- describe

Available documentation

- Architectural: full | original designer name/date: Warren and Mahoney
- Structural: full | original designer name/date: City Solutions
- Mechanical | original designer name/date:
- Electrical | original designer name/date:
- Geotech report | original designer name/date:

Damage

Site: (refer DEE Table 4-2)

- Site performance:
- Describe damage: minor - none
- Settlement: none observed | notes (if applicable):
- Differential settlement: none observed | notes (if applicable):
- Liquefaction: none apparent | notes (if applicable):
- Lateral Spread: none apparent | notes (if applicable):
- Differential lateral spread: none apparent | notes (if applicable):
- Ground cracks: none apparent | notes (if applicable):
- Damage to area: none apparent | notes (if applicable):

Building:

- Current Placard Status:
- Along — Damage ratio: 0% | Describe how damage ratio arrived at: Qualitataive judgement
- Describe (summary):
- Across — Damage ratio: 0%
- Describe (summary):

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

- Diaphragms — Damage?: no | Describe:
- CSWs: — Damage?: no | Describe:
- Pounding: — Damage?: no | Describe:
- Non-structural: — Damage?: yes | Describe: Damage to floor slabs and suspended ceilings

Recommendations

- Level of repair/strengthening required: minor structural | Describe: Lateral restraint required to high roof above clerestory wind
- Building Consent required: yes | Describe: Remedial structural work
- Interim occupancy recommendations: full occupancy | Describe:
- Along — Assessed %NBS before: 85% | ##### %NBS from IEP below
- Assessed %NBS after: 85%
- If IEP not used, please detail assessment methodology: Post 1992 Structure - Direct Code Comparison
- Across — Assessed %NBS before: 46% | ##### %NBS from IEP below
- Assessed %NBS after: 46%

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): 2004-
- h_n from above: 5m
- Seismic Zone, if designed between 1965 and 1992:
- Design Soil type from NZS1170.5:2004, cl 3.1.3: not required for this age of building

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

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

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

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

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

2.2 Near Fault Scaling Factor

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

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

2.3 Hazard Scaling Factor

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

Z_{1992}, from NZS4203:1992

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

2.4 Return Period Scaling Factor

Building Importance level (from above): 2

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

2.5 Ductility Scaling Factor

	along	across
Assessed ductility (less than max in Table 3.2)		
Ductility scaling factor: =1 from 1976 onwards; or =kμ, if pre-1976, fromTable 3.3:		
Ductiity Scaling Factor, **Factor D**:	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, $(NBS\%)_b = (\%NBS)_{nom} \times A \times B \times C \times D \times E$

$\%NBS_b$: **#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

3.6. Other factors, Factor F

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

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

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

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

4.3 PAR x (%NBS)b: PAR x Baselline %NBS: **#DIV/0!** **#DIV/0!**

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

Official Use only:

Accepted By

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