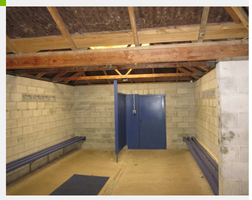

Project: Belfast Pool – Main Building Complex

Qualitative Engineering Evaluation

Prepared for: **Christchurch City Council**

Project: 227995

Date: 9 October 2013

Building Functional Location ID : PRO 0370 B004

Building Name : Belfast Pool – Main Building Complex

Building Address : 710 Main North Road

Document Control Record

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1	30 May 2012	Final	S. Manning	S. Manning	F. Lanning	F. Lanning
2	**09 October 2013**	Final	S. Manning	S. Manning	F. Lanning	F. Lanning
Current Revision		**2**				

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

Contents

Executive Summary

This is a summary of the Qualitative Report for the Belfast Pool – Main Building Complex 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	Belfast Pool – Main Building Complex	BuildLoc ID:	PRO 0370 B004	
Building Address	710 Main North Road, Belfast				
Foot Print m^2	200	Stories Above Ground	1	Stories Below Ground	0
Approximate Year Built	1970's	Building Age Years	40	Number of Residential Units	0
Building Current Use	Changing rooms and storage				
Type of Construction	Light timber roof on concrete masonry walls				

Qualitative L4 Report Results Summary		
Building Occupied	Y	Changing rooms occupied when the pool is in use.
Suitable for Continued Occupancy	N	Remedial works should be completed before rooms are returned to full use.
Critical Structural Weaknesses	Y	Potentially unstable partition walls.
Building %NBS From Assessment	70%	Roof diaphragm connection at the top of masonry walls out of plane lateral restraint.
Key Damage Summary	Y	Refer to summary of building damage section 3.1 report body.

Qualitative L4 Report Recommendations		
Levels Survey Required	N	No evidence of differential settlement or cracks in the foundation due to the earthquake.
Geotechnical Survey Required	N	No liquefaction or settlement is evident in the building or in the surrounding area.
Multiple Structure Site	Y	Pool located adjacent to Belfast Primary School.
Proceed Directly To L5 Quantitative DEE	Y	Remedial measures required to laterally unsupported concrete masonry walls identified on sketch attached in Appendix A.

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

1. Introduction

On 13 February 2012 Aurecon engineers visited the Belfast Pool – Main Building Complex to carry out a qualitative building damage assessment on behalf of Christchurch City Council. Detailed visual inspections were carried out to assess the damage caused by the earthquakes on 4 September 2010, 22 February 2011, 13 June 2011, 23 December and related aftershocks.

The scope of work included:

- Assessment of the nature and extent of the building damage.
- Visual assessment of the building strength particularly with respect to safety of occupants if the building is currently occupied.
- Assessment of requirements for detailed engineering evaluation including geotechnical investigation, level survey and any areas where linings and floor coverings need removal to expose structural damage.

This report outlines the results of our Qualitative Assessment of damage to the Belfast Pool – Main Building Complex 710 Main North Road, Belfast and is based on the Detailed Engineering Evaluation Procedure document issued by the Structural Advisory Group on 19 July 2011, visual inspections, available structural documentation and summary calculations as appropriate.

2. Description of the Building

2.1 Building Age and Configuration

The Belfast Pool – Main Building Complex is a long, single storey, slab on grade, concrete masonry building. Light weight roofing iron is supported by light timber framing (small spans). The buildings footprint is approximately 200 square meters (45 meters by 4.4 meters). The building is made up of four areas accessed from the exterior (two store rooms, two changing rooms and an office). This building is an importance level 2 structure.

2.2 Building Structural Systems Vertical and Horizontal

Transverse lateral loads are resisted by the concrete masonry shear walls. Lateral loads originate from both the roof structure and the masonry walls. The roof diaphragm transfers longitudinal and transverse horizontal loads to the masonry shear walls. Vertical load from the iron roofing is carried by light timber framing that then is transferred to the masonry walls around the perimeter. The masonry walls are supported by shallow concrete strip foundations.

2.3 Reference Building Type

The Belfast pool building is a basic single storey partially filled concrete masonry structure. Damage, although minor, is most notable at the corners of walls and at mid-points (diagonal cracks forming). Although walls are partially filled rather than all cells filled the building has performed adequately due to the large number of walls present. Only small hairline cracks are evident. The lack of grout fill in all wall cells has not resulted in significant damage at this stage.

2.4 Building Foundation System and Soil Conditions

The foundation system although not inspected directly very likely consists of shallow concrete strip footings. Soil in the surrounding area is categorised as technical category 2 (TC2) yellow meaning that it may be susceptible to liquefaction and associated settlement in future large earthquakes and may require specific design for foundations.

2.5 Available Structural Documentation and Inspection Priorities

No drawings were available however after inspection possible hazards were identified. This was where partially filled partition walls and unfilled external walls lack lateral support.

2.6 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.

3. Structural Investigation

3.1 Summary of Building Damage

The Belfast Pool – Main Building Complex is currently in use. Belfast Primary Schools caretaker was available and was helpful in providing access and assisting with the building inspection.

Minor damage to the concrete masonry changing rooms in the form of diagonal cracks across the walls was noted. The walls were investigated by means of acoustic assessment and it was concluded that they were partially filled.

Recently repaired external screen walls at the entrance to the changing rooms were identified as being unfilled concrete masonry.

Some displacement damage around the edge of the pool between the side and the surrounding slab was also identified.

3.2 Record of Intrusive Investigation

No intrusive investigation was required as primary structural elements were all visible.

3.3 Damage Discussion

Damage to the walls could be partly due to lack of shrinkage control joints on the long walls. Generally cracks were hairline and not significant in terms of structural damage. Any damage should have minimal effect on the capacity of the building to continue to carry gravity and lateral loads.

4. Building Review Summary

4.1 Building Review Statement

As all the critical structural components of this building were visible a sample of each component type was able to be directly viewed. Only the foundations were not able to be directly reviewed however as surface cracks were not evident on the concrete slab and there was no evidence of settlement the foundation has been inferred as adequate. After inspection of the walls it was deemed that they were partially filled with concrete and generally had adequate lateral support. Partially filled internal walls and unfilled unrestrained external screen walls as marked on the sketch in appendix A were deemed to be potentially hazardous.

4.2 Critical Structural Weaknesses

Apart from lack of lateral support to some walls no specific critical structural weaknesses affecting global structural stability were identified as part of the building qualitative assessment.

5. Building Strength Assessment

(Refer to Appendix C for background information)

This structure was not subject to specific engineering design and the IEP assessment is not considered appropriate. Nevertheless an assessment of building lateral load capacity can be made by considering the likely critical failure mechanisms and making appropriate simplifying assumptions.

The Belfast Pool building has numerous concrete masonry internal and external walls. These walls in conjunction with the roof acting as a diaphragm resist lateral loads. Due to the number and length of the walls and the fact that they are well distributed throughout the building it is considered unlikely that these walls will undergo in-plane failure. No evidence of in-plane failure was discovered during the site inspection.

Lateral out-of-plane restraint to the walls is provided by the connection between the roof structure and the top of the concrete masonry walls. This connection is critical to overall building stability and has been assessed as being able to sustain 70%NBS. This figure has been adopted as the global percentage NBS for the building.

Walls where insufficient lateral restraint has been provided have been identified on the sketch plan attached in Appendix A. These walls are required to be removed or, where feasible, strengthening provided. The attached sketch plan shows the walls that are recommended to be demolished and identifies walls that could be strengthened.

6. Conclusions and Recommendations

The land below the Belfast Pool building is zoned TC2 and as such has been identified as somewhat prone to liquefaction and settlement. However there is minimal evidence of settlement and liquefaction in the area as well as a lack of cracking in walls and concrete slabs.

It is recommended that the internal non-structural partition walls in the men's and women's changing rooms, as shown on the plan, are braced by means of a steel channel installed to distribute out of plane loads into adjacent return walls.

It is recommended that the unfilled unrestrained external screen walls at the entrance to the men's and women's changing rooms, as identified on the sketch plan, are removed and replaced with lightweight screens.

The building is currently in use as changing rooms. It is our recommendation that occupancy should be restricted until the safety and strengthening works specified are completed.

7. Explanatory Statement

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

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

While this report may assist the client in assessing whether the building should be repaired, strengthened, or replaced 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.

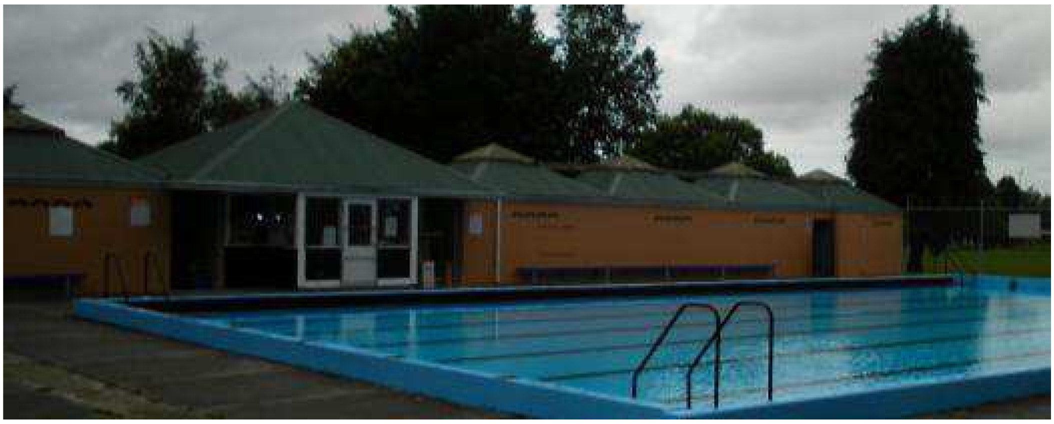
Without limiting any of the above, Aurecon's liability, whether under the law of contract, tort, statute, equity or otherwise, is limited as set out in the terms of the engagement with the client.

Appendices

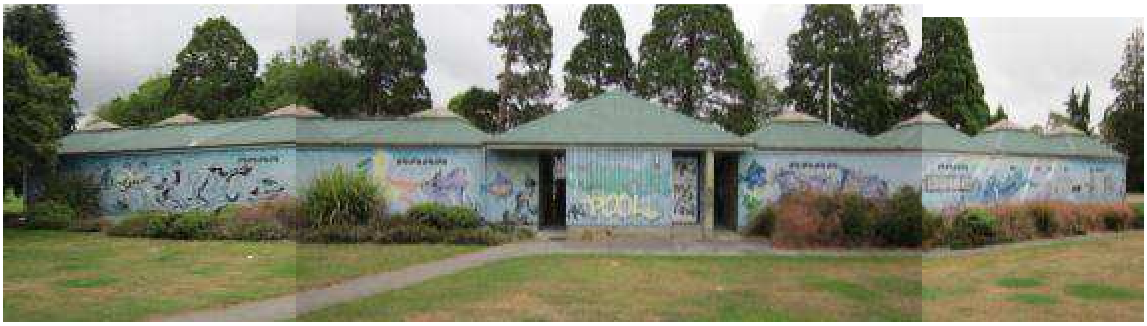
Appendix A
Photos and Sketches

Site Photographs (13 February 2012)

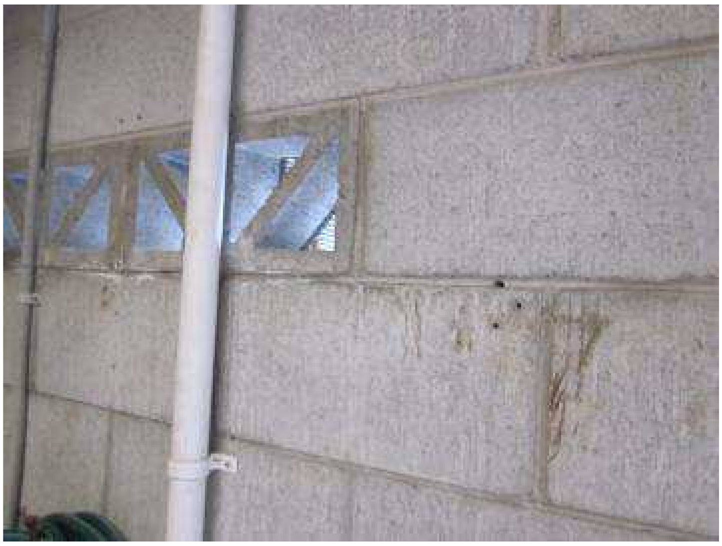
Aerial Photo



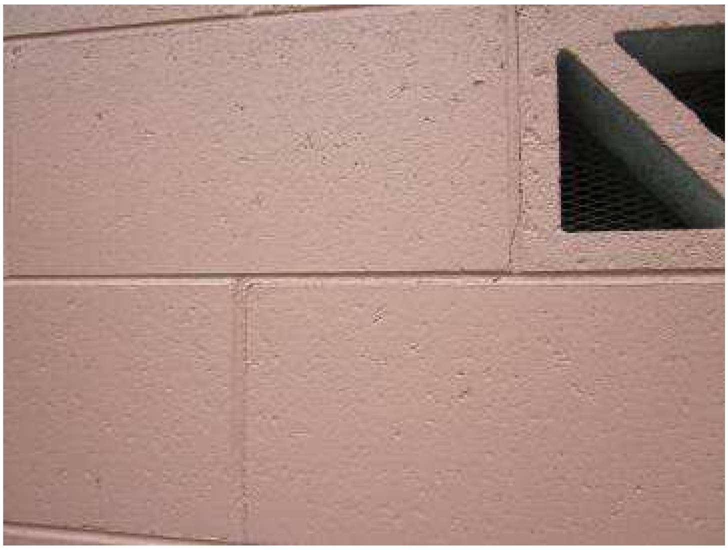
Building South Elevation



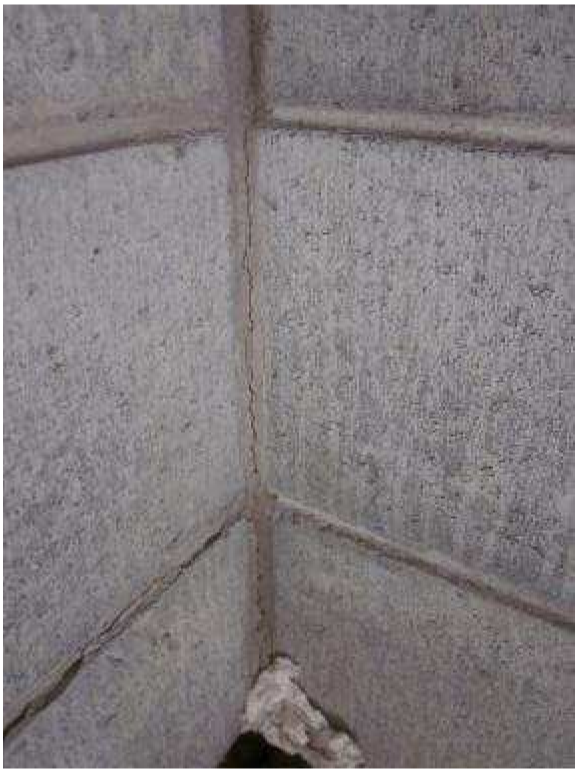
Building North Elevation



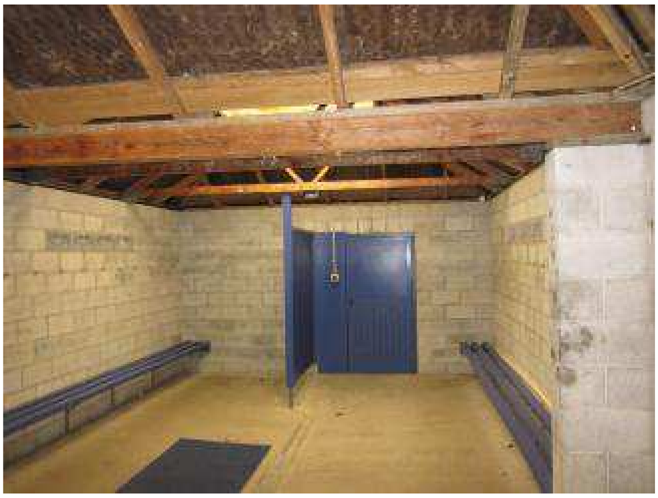
Diagonal cracking on internal wall in women’s changing room (West End)



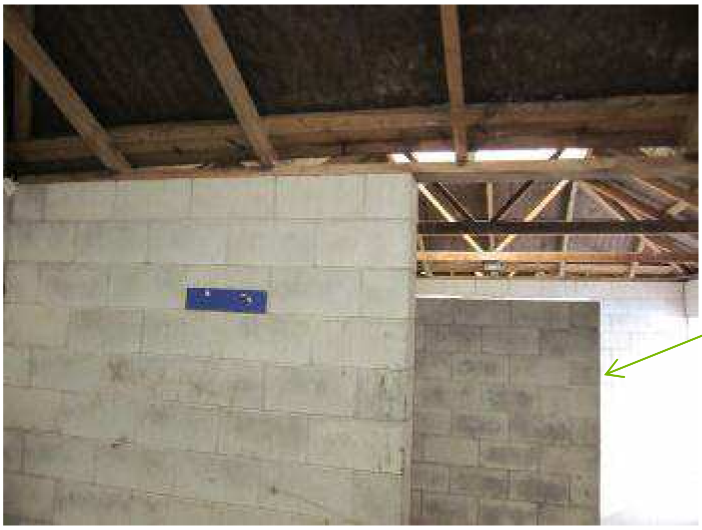
Cracking on external southern wall.



Cracking on interior corners of building in men's changing room (East end)

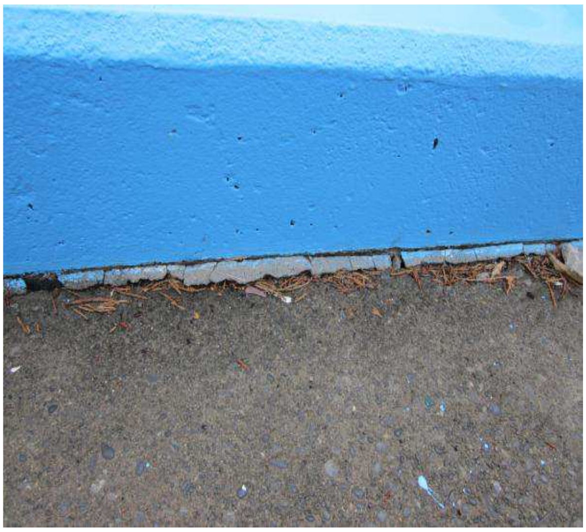


No noticeable damage to light timber roof frames



Potential fall hazard of hollow internal walls.

Cracking on base of pool



Concrete slab pulling away from edge of pool

Appendix B

Reference Documents and Material

1. New Zealand Society for Earthquake Engineering (NZSEE) 2006 Study Group Recommendations "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes" – June 2006
2. 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
3. Standards New Zealand, "AS/NZS 1170 Part 0, Structural Design Actions: General Principles", 2002
4. Standards New Zealand, "AS/NZS 1170 Part 1, Structural Design Actions: Permanent, imposed and other actions", 2002
5. Standards New Zealand, "NZS 1170 Part 5, Structural Design Actions: Earthquake Actions – New Zealand", 2004
6. Standards New Zealand, "NZS 4229, Concrete Masonry Buildings Not Requiring Specific Engineering Design", 1999
7. Standards New Zealand, "NZS 4230, Design of Reinforced Concrete Masonry Structures", 2004

Appendix C

Explanation of Strength Assessment

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 high risk or 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 Build Act). If the building strength exceeds 33%NBS but is less than 67%NBS the building is considered a moderate risk building. Above 67%NBS is considered low 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).

Earthquake Resistance Standards

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 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. 0.2% in the next 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

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:	Belfast Pool - Main Building Complex	Reviewer:	Simon Manning
	Unit / No: 710 / Street: Main North Road	CPEng No:	132053
Building Address:	710 Main North Road	Company:	Aurecon
Legal Description:		Company project number:	227995
		Company phone number:	3660821
GPS south:	Degrees 43, Min 27, Sec 11.52	Date of submission:	9/10/2013
GPS east:		Inspection Date:	13-Feb-12
		Revision:	2
Building Unique Identifier (CCC):	PRO 0370 B004	Is there a full report with this summary?	yes

Site

Site slope:	flat	Max retaining height (m):	
Soil type:	mixed	Soil Profile (if available):	
Site Class (to NZS1170.5):	D		
Proximity to waterway (m, if <100m):		If Ground improvement on site, describe:	
Proximity to clifftop (m, if < 100m):			
Proximity to cliff base (m,if <100m):		Approx site elevation (m):	10.00

Building

No. of storeys above ground:	1 (single storey = 1)	Ground floor elevation (Absolute) (m):	10.10
Ground floor split?	no	Ground floor elevation above ground (m):	0.10
Storeys below ground	0		
Foundation type:	strip footings	if Foundation type is other, describe:	
Building height (m):	3.00	height from ground to level of uppermost seismic mass (for IEP only) (m):	2.5
Floor footprint area (approx):	200		
Age of Building (years):	40	Date of design:	1965-1976
Strengthening present?	no	If so, when (year)?	
		And what load level (%g)?	
Use (ground floor):	public	Brief strengthening description:	
Use (upper floors):			
Use notes (if required):			
Importance level (to NZS1170.5):	IL2		

Gravity Structure

Gravity System:	load bearing walls		
Roof:	timber framed	rafter type, purlin type and cladding	Sawn timber, lightweight iron roofing
Floors:	concrete flat slab	slab thickness (mm)	150
Beams:	timber	type	Sawn timber
Columns:	load bearing walls	typical dimensions (mm x mm)	1000 x 2000
Walls:	partially filled concrete masonry	thickness (mm)	

Lateral load resisting structure

Note: Define along and across in detailed report!

Lateral system along:	partially filled CMU		note total length of wall at ground (m):	50
Ductility assumed, μ:	1.00		wall thickness (m):	0.2
Period along:	0.40	0.40 from parameters in sheet	estimate or calculation?	estimated
Total deflection (ULS) (mm):	15		estimate or calculation?	estimated
maximum interstorey deflection (ULS) (mm):	15		estimate or calculation?	estimated
Lateral system across:	partially filled CMU		note total length of wall at ground (m):	5
Ductility assumed, μ:	1.00		wall thickness (m):	0.2
Period across:	0.40	0.40 from parameters in sheet	estimate or calculation?	estimated
Total deflection (ULS) (mm):	15		estimate or calculation?	estimated
maximum interstorey deflection (ULS) (mm):	15		estimate or calculation?	estimated

Separations: (leave blank if not relevant)

north (mm):	
east (mm):	
south (mm):	
west (mm):	

Non-structural elements

Stairs:			
Wall cladding:			
Roof Cladding:	Metal	describe	Lightweight iron roof cladding
Glazing:			
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:	Slight soil distortion
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:	none apparent	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:	
Non-structural:	Damage?:	no	Describe:	small cracks in wall

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

Recommendations

Level of repair/strengthening required:	minor non-structural	Describe:	
Building Consent required:	yes	Describe:	
Interim occupancy recommendations:	do not occupy	Describe:	Remedial works should be completed before rooms are re

Along	Assessed %NBS before:	70%	##### %NBS from IEP below	If IEP not used, please detail assessment methodology: Qualitative assessment only required
	Assessed %NBS after:	70%		
Across	Assessed %NBS before:	70%	##### %NBS from IEP below	
	Assessed %NBS after:	70%		

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: 2.5m

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

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**:	0.00	0.00

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

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

3.5. Site Characteristics 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:	**#DIV/0!**	**#DIV/0!**
4.4 Percentage New Building Standard (%NBS), (before)		**#DIV/0!**

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