New Brighton Pier - Toilets

Qualitative Engineering Evaluation

Reference: 228661
Prepared for:
Christchurch City Council

Functional Location ID: PRK_1330_BLDG_002

Address: 213 Marine Parade

Revision: 2
Date: 15 October 2013

Document Control Record

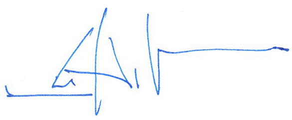
Document prepared by:

Aurecon New Zealand Limited
Level 2, 518 Colombo Street
Christchurch 8011

PO Box 1061
Christchurch 8140
New Zealand

T +64 3 375 0761
F +64 3 379 6955
E christchurch@aurecongroup.com
W aurecongroup.com

Document control						aurecon
Report Title		Qualitative Engineering Evaluation				
Functional Location ID		PRK_1330_BLDG_002	**Project Number**		228661	
File Path		P:\ 228661 - New Brighton Pier - Toilets.docx				
Client		Christchurch City Council	**Client Contact**		Michael Sheffield	
Rev	**Date**	**Revision Details/Status**	**Prepared**	**Author**	**Verifier**	**Approver**
1	**10 January 2013**	Draft	C. Bong	C. Bong	L. Castillo	L. Castillo
2	**15 October 2013**	Final	C. Bong	C. Bong	L. Castillo	L. Castillo
Current Revision		**2**				

Approval			
Author Signature		Approver Signature	
Name	Christopher Bong	Name	Luis Castillo
Title	Structural Engineer	Title	Senior Structural Engineer

Contents

Appendices

Executive Summary

This is a summary of the Qualitative Engineering Evaluation for the New Brighton Pier - Toilets building and is based on the Detailed Engineering Evaluation Procedure document issued by the Engineering Advisory Group on 19 July 2011, visual inspections, available structural documentation and summary calculations as appropriate.

Building Details	**Name**	New Brighton Pier - Toilets			
Building Location ID	PRK_1330_BLDG_002			**Multiple Building Site**	Y
Building Address	213 Marine Parade, New Brighton			**No. of residential units**	0
Soil Technical Category	NA	**Importance Level**	2	**Approximate Year Built**	1998
Foot Print (m²)	87	**Stories above ground**	1	**Stories below ground**	0
Type of Construction	Pedestrian footbridge above the toilets consists of a hollow core floor with concrete topping; interior and exterior concrete wall panels founded on strip footings and the concrete floor on a concrete slab on grade foundation.				

Qualitative L4 Report Results Summary		
Building Occupied	Y	The New Brighton Pier - Toilets is currently in service.
Suitable for Continued Occupancy	Y	The New Brighton Pier - Toilets is suitable for continued use.
Key Damage Summary	Y	Refer to summary of building damage Section 3.1 of report body.
Critical Structural Weaknesses (CSW)	N	No critical structural weaknesses were identified.
Levels Survey Results	Y	Variations in floor levels are considered acceptable for wet areas despite not being within the Department of Building and Housing's Guidelines.
Building %NBS From Analysis	>67%	Based on an analysis of bracing capacity and the comparison of the current code (NZS 1170 Part 5:2004) to the code of the day (NZS 4203:1992).

Qualitative L4 Report Recommendations		
Geotechnical Survey Required	N	Geotechnical survey not required due to lack of observed ground damage on site.
Proceed to L5 Quantitative DEE	N	A quantitative DEE is not required for this structure. It is recommended that this report is considered FINAL.

Approval			
Author Signature		Approver Signature	
Name	Christopher Bong	Name	Luis Castillo
Title	Structural Engineer	Title	Senior Structural Engineer

1 Introduction

1.1 General

On 17 May 2012 Aurecon engineers visited the New Brighton Pier - Toilets 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 2011 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 New Brighton Pier - Toilets 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 New Brighton Pier - Toilets was built in 1998 as part of the New Brighton Library's pedestrian bridge. The pedestrian bridge runs in the North-South direction and lies just south of the iconic New Brighton Pier.

As part of the New Brighton Library's pedestrian bridge, the toilet building has a concrete hollow core slab with a concrete topping for a roof and reinforced concrete walls. The building is founded on a concrete slab on grade foundation floor with strip footings beneath the reinforced concrete walls.

The footprint of the building is approximately 87 square metres. It is an Importance Level 2 Structure in accordance with NZS 1170 Part 0: 2002.

2.2 Building Structural Systems Vertical and Horizontal

The gravity and lateral load resisting structure consists of a rigid roof diaphragm which distributes the loads between the internal and external walls of the building. These walls are founded on local strip footings which distribute the loads into the soil below.

2.3 Reference Building Type

The New Brighton Pier - Toilets is a reinforced concrete shear wall structure typical of the late 1990s. It is highly likely that the concrete shear walls were subject to specific engineering design to the NZS 4203:1992 loadings code and the NZS 3101:1995 concrete code. A general overview of the reference building type, construction era and likely earthquake risk is presented in the figure below and according to the figure below is "probably not earthquake prone".

Figure 1: Timeline showing the building types, approximate time of construction and likely earthquake risk. (From the Draft Guidance on DEEs of non-residential buildings by the Engineering Advisory Group)

Given the stiff nature of reinforced concrete shear walls, buildings of this nature are particularly prone to torsional instabilities as a result of plan irregularities. However, as toilet blocks typically lack significant door, window or service openings and generally have well distributed partition walls thus precluding them from the aforementioned issues.

Additionally, the recent construction of the building implies a close compliance between the current code, NZS 1170 Part 5: 2004 and code of the day, NZS 4203:1992, the concrete shear wall buildings have generally performed well in the recent Canterbury earthquake sequence.

2.4 Building Foundation System and Soil Conditions

The New Brighton Pier - Toilets has a concrete slab foundation and strip footings beneath the concrete shear walls. As the facilities in the immediate vicinity are for non-residential purposes, the land that the building sits on is precluded from the Department of Building and Housing (DBH) technical classifications. It is of note however that the land adjacent to the building is considered as "Technical Category 2" (TC2) land. According to CERA, TC2 land "may incur minor to moderate land damage from liquefaction".

2.5 Available Structural Documentation and Inspection Priorities

The only drawings available for the New Brighton Pier - Toilets were the pricing drawings by Barclay Architects Limited dated 20 April 1998.

The inspection priority for our assessment was the review of damage to the reinforced concrete shear wall which is the primary gravity and lateral load resisting element. The focus of the damage assessment was on the building geometry and other forms of potential damage such as the cracking in the concrete shear wall and the concrete floor.

2.6 Available Survey Information

A floor level survey was undertaken to establish the level of unevenness across the floors. The results of the survey are presented on the attached sketch in Appendix A. All of the levels were taken on top of the existing floor coverings which may have introduced some margin of error.

The Department of Building and Housing (DBH) published the "Revised Guidance on Repairing and Rebuilding Houses Affected by the Canterbury Earthquake Sequence" in November 2011, which recommends some form of re-levelling or rebuilding of the floor

1. If the slope is greater than 0.5% for any two points more than 2m apart, or
2. If the variation in level over the floor plan is greater than 50mm, or
3. If there is significant cracking of the floor.

It is important to note that these figures are recommendations and are only intended to be applied to residential buildings. However, they provide useful guidance in determining acceptable floor level variations.

The floor levels for the New Brighton Pier - Toilets are considered to be acceptable despite not being within the recommended tolerances. This is because the toilet block floors have an in-built fall for drainage, often outside the DBH recommendations.

3 Structural Investigation

3.1 Summary of Building Damage

The New Brighton Pier - Toilets was in service at the time of the damage assessment. The building has performed well and has suffered no noted seismic related damage. The only damage noted was shrinkage cracking on the concrete floor which would have been age rather than seismic related

3.2 Record of Intrusive Investigation

The extent of damage was relatively minor and therefore, an intrusive investigation was neither warranted nor undertaken for New Brighton Pier - Toilets.

3.3 Damage Discussion

There was no noted damage to the New Brighton Pier - Toilets as a result of seismic actions. This is not surprising as buildings of this nature are generally designed to remain linear elastic in an ultimate limit state earthquake.

4 Building Review Summary

4.1 Building Review Statement

As noted above no intrusive investigations were undertaken for the New Brighton Pier - Toilets. Because of the generic nature of the building, a significant amount of information can be inferred from an external and internal inspection.

The greatest uncertainty is the level of reinforcement of the walls as the structural drawings were unavailable. The foundations of the building were not visually assessable given the concrete aprons around the building.

4.2 Critical Structural Weaknesses

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

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

5.1 General

The New Brighton Pier - Toilets is a typical reinforced concrete shear wall structure constructed in the late 1990s. Buildings of this nature would have typically been subject to specific engineering design to the code of the day, the loadings code, NZS 4203:1992 and the concrete material code, NZS 3101:1995. Being immediate predecessors of the current code, there is a good level of compliance between the code of the day and the current code.

5.2 Initial %NBS Assessment

The New Brighton Pier - Toilets has been subject to specific engineering design and the initial evaluation procedure is an appropriate method of assessment for this building. The selected seismic assessment parameters are tabulated in the table below.

Table 1: Parameters used in the Seismic Assessment

Seismic Parameter	Quantity	Comment/Reference
Site Soil Class	D	NZS 1170.5:2004, Clause 3.1.3, Deep or Soft Soil.
Site Hazard Factor, Z	0.30	DBH Info Sheet on Seismicity Changes. (Effective 19 May 2011)
Return period Factor, R_u	1.00	NZS 1170.5:2004, Table 3.5. Importance Level 2, 50 year design life.
Ductility Factor in the Along Direction, μ	1.25	Reinforced concrete shear walls.
Ductility Factor in the Across Direction, μ	1.25	Reinforced concrete shear walls.

Using the IEP, the %NBS score was calculated to be 69%NBS.

A comparison between the two loading codes, the code of the day, NZS 4203:1992 and current code NZS 1170: Part 5:2002 have shown that the walls were designed to earthquake loads of 82%NBS.

As such, the building is considered a “low risk” building in accordance to the New Zealand Society for Earthquake Engineering (NZSEE) guidelines.

5.3 Results Discussion

A number of basic analysis shows that the New Brighton Pier - Toilets is capable of achieving seismic performance in excess of 67%NBS. This is not surprising given the recent construction of the building to the predecessor to the current codes. Furthermore, given that toilet buildings such as this have well-distributed reinforced concrete walls and lack significant door, window or service openings, the building has good seismic resilience and good torsional stability.

6 Conclusions and Recommendations

Given the lack of damage noted to both the structure and the land in the immediate vicinity of the New Brighton Pier - Toilets:-

- A geotechnical investigation is not considered necessary; and
- The building is suitable for continued occupation.

7 Explanatory Statement

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

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

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

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

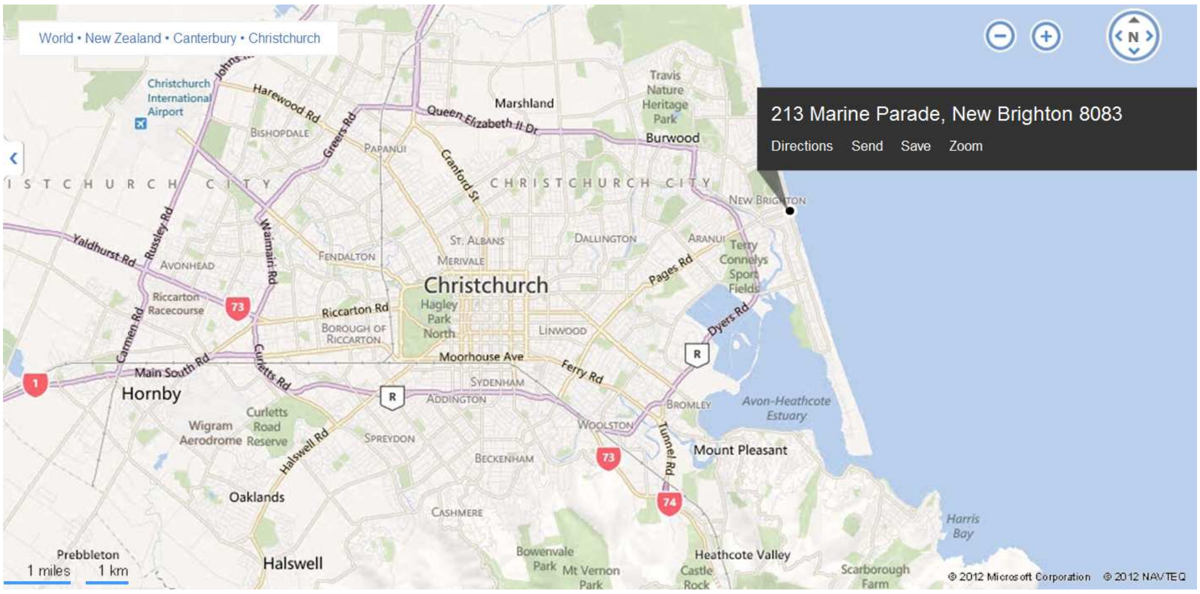
This review has been prepared by Aurecon at the request of its client and is exclusively for the client's use. It is not possible to make a proper assessment of this review without a clear understanding of the terms of engagement under which it has been prepared, including the scope of the instructions 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

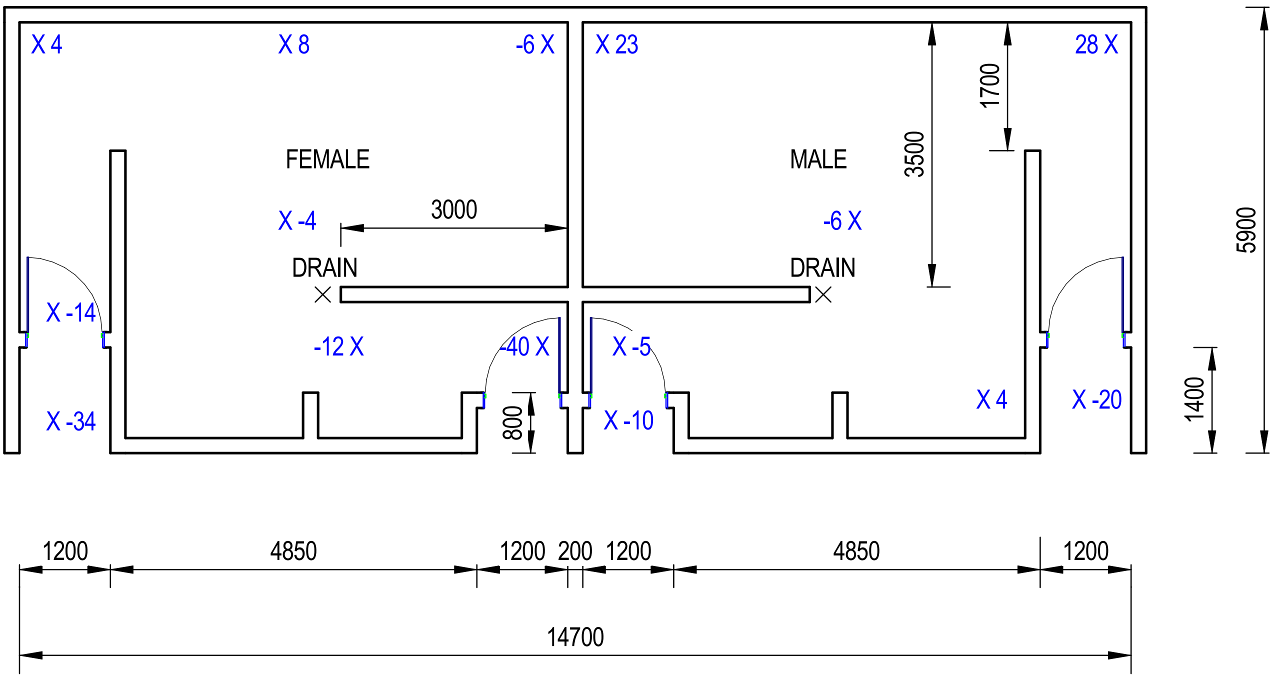
Appendix A
Site Location, Photos and Levels Survey

17 May 2012 – New Brighton Pier - Toilets Site Photographs



Northern elevation of the New Brighton Pier - Toilets.	
Northern eastern elevation of the New Brighton Pier - Toilets.	

Shrinkage crack in the interior corner of the building.	
A close up of the shrinkage crack in the interior corner of the building.	
Interior view of the toilets.	
Another interior view of the toilets.	



10/01/2013 12:01:45 p.m.

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CLIENT
Christchurch City Council

REV	DATE	REVISION DETAILS	APPROVAL

DRAWN	DESIGNED
D.HUNIA	A.WILLARD

CHECKED: L.CASTILLO

APPROVED: L.CASTILLO DATE

PROJECT: NEW BRIGHTON PIER TOILETS

TITLE: LEVEL SURVEY

PRELIMINARY
NOT FOR CONSTRUCTION

PROJECT No.: 228661

SCALE: 1 : 100 | SIZE: A4

DRAWING No.: S-01-00 | REV:

Appendix B
References

1. Department of Building and Housing (DBH), "Revised Guidance on Repairing and Rebuilding Houses Affected by the Canterbury Earthquake Sequence", November 2011

2. New Zealand Society for Earthquake Engineering (NZSEE), "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes", April 2012

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 3101 Part 1, The Design of Concrete Structures", 2006

7. Standards New Zealand, "NZS 3404 Part 1, Steel Structures Standard", 1997

8. Standards New Zealand, "NZS 3606, Timber Structures Standard", 1993

9. Standards New Zealand, "NZS 3604, Timber Framed Structures", 2011

10. Standards New Zealand, "NZS 4229, Concrete Masonry Buildings Not Requiring Specific Engineering Design", 1999

11. Standards New Zealand, "NZS 4230, Design of Reinforced Concrete Masonry Structures", 2004

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

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

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

Table C1: Relative Risk of Building Failure In A

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

Appendix D
Background and Legal Framework

Background

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

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

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

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

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

Compliance

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

Canterbury Earthquake Recovery Authority (CERA)

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

Section 38 – Works

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

Section 51 – Requiring Structural Survey

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

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

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

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

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

Building Act

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

Section 112 – Alterations

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

Section 115 – Change of Use

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

Section 121 – Dangerous Buildings

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

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

Section 122 – Earthquake Prone Buildings

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

Section 124 – Powers of Territorial Authorities

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

Section 131 – Earthquake Prone Building Policy

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

Christchurch City Council Policy

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

The 2010 amendment includes the following:

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

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

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

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

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

Building Code

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

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

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

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

Appendix E
Standard Reporting Spread Sheet

Detailed Engineering Evaluation Summary Data V1.11

Location

- Building Name: New Brighton Pier - Toilets
- Building Address: Unit: — No: 213 Street: Marine Parade
- Legal Description: Lot 4 DP 50951
- GPS south: Degrees 43, Min 30, Sec 26.61
- GPS east: Degrees 172, Min 43, Sec 53.73
- Building Unique Identifier (CCC): PRK_1330_BLDG_002
- Reviewer: Lee Howard
- CPEng No: 1008889
- Company: Aurecon NZ Ltd
- Company project number: 228661
- Company phone number: 03 366 0821
- Date of submission: Oct-13
- Inspection Date: May-12
- Revision: 2
- Is there a full report with this summary? yes

Site

- Site slope: flat
- Soil type: silt
- 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): 0
- Soil Profile (if available):
- If Ground improvement on site, describe:
- Approx site elevation (m): 0.00

Building

- No. of storeys above ground: 1 (single storey = 1)
- Ground floor split? no
- Storeys below ground: 0
- Foundation type: mat slab
- Building height (m): 3.40
- Floor footprint area (approx): 87
- Age of Building (years): 14
- Ground floor elevation (Absolute) (m): 0.10
- Ground floor elevation above ground (m): 0.10
- if Foundation type is other, describe:
- height from ground to level of uppermost seismic mass (for IEP only) (m):
- Date of design: 1992-2004
- Strengthening present? no
- If so, when (year)?
- And what load level (%g)?
- Brief strengthening description:
- Use (ground floor): public
- Use (upper floors):
- Use notes (if required): toilet block
- Importance level (to NZS1170.5): IL2

Gravity Structure

- Gravity System: load bearing walls
- Roof: concrete
- Floors: concrete flat slab — slab thickness (mm):
- Beams: none — slab thickness (mm):
- Columns: — overall depth x width (mm x mm):
- Walls: load bearing concrete — #N/A

Lateral load resisting structure

Note: Define along and across in detailed report!

- Lateral system along: concrete shear wall — enter wall data in "IEP period calcs" worksheet for period calculation
- Ductility assumed, μ: 1.25
- Period along: 0.40 ##### enter height above at H31 — estimate or calculation? estimated
- Total deflection (ULS) (mm): — estimate or calculation?
- maximum interstorey deflection (ULS) (mm): — estimate or calculation?
- Lateral system across: concrete shear wall — enter wall data in "IEP period calcs" worksheet for period calculation
- Ductility assumed, μ: 1.25
- Period across: 0.40 ##### enter height above at H31 — estimate or calculation? estimated
- Total deflection (ULS) (mm): — estimate or calculation?
- maximum interstorey deflection (ULS) (mm): — estimate or calculation?

Separations: (leave blank if not relevant)

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

Non-structural elements

- Stairs:
- Wall cladding: 200 thick reinforced concrete walls
- Roof Cladding:
- Glazing:
- Ceilings:
- Services(list):

Available documentation

- Architectural: partial — original designer name/date: Bayclay Architects Ltd
- 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: minor cracking in floor but could be due to long term settle
- 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: green
- Along — Damage ratio: 0% — Describe how damage ratio arrived at:
- 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?: no — Describe:

Recommendations

- Level of repair/strengthening required: none — Describe:
- Building Consent required: no — Describe:
- Interim occupancy recommendations: full occupancy — Describe:
- Along — Assessed %NBS before e'quakes: 82% — 69% %NBS from IEP below — If IEP not used, please detail assessment methodology:
- Assessed %NBS after e'quakes: 82%
- Across — Assessed %NBS before e'quakes: 82% — 69% %NBS from IEP below
- Assessed %NBS after e'quakes: 82%

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:	24.0%	24.0%
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	1.00	
Note 2: for RC buildings designed between 1976-1984, use 1.2	1.0	
Note 3: for buildngs designed prior to 1935 use 0.8, except in Wellington (1.0)	1.0	
Final $(\%NBS)_{nom}$:	**24%**	**24%**

2.2 Near Fault Scaling Factor

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

2.3 Hazard Scaling Factor

Hazard factor Z for site from AS1170.5, Table 3.3:	0.30
Z_{1992}, from NZS4203:1992	0.8
Hazard scaling factor, **Factor B**:	2.666666667

2.4 Return Period Scaling Factor

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

		along	across
2.5 Ductility Scaling Factor	Assessed ductility (less than max in Table 3.2)	1.25	1.25
	Ductility scaling factor: =1 from 1976 onwards; or =kμ, if pre-1976, fromTable 3.3:	1.14	1.14
	Ductiity Scaling Factor, **Factor D**:	1.00	1.00
2.6 Structural Performance Scaling Factor:	Sp:	0.925	0.925
	Structural Performance Scaling Factor **Factor E**:	1.081081081	1.081081081
2.7 Baseline %NBS, $(NBS\%)_b = (\%NBS)_{nom}$ x A x B x C x D x E	**$\%NBS_b$:**	**69%**	**69%**

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

3.1. Plan Irregularity, factor A:	insignificant	1
3.2. Vertical irregularity, Factor B:	insignificant	1
3.3. Short columns, Factor C:	insignificant	1
3.4. Pounding potential	Pounding effect D1, from Table to right	1.0
	Height Difference effect D2, from Table to right	1.0
	Therefore, Factor D:	1
3.5. Site Characteristics	insignificant	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	1.0	1.0
	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)		**1.00**	**1.00**
4.3 PAR x (%NBS)b:	PAR x Baselline %NBS:	**69%**	**69%**
4.4 Percentage New Building Standard (%NBS), (before)			**69%**

Official Use only:

Accepted By

Date:

Aurecon New Zealand Limited
Level 2, 518 Colombo Street
Christchurch 8011
PO Box 1061
Christchurch 8140
New Zealand

T +64 3 375 0761
F +64 3 379 6955
E christchurch@aurecongroup.com
W aurecongroup.com