



Christchurch City Council

Garden of Tane
PRK 3742 BLDG 001 EQ2

Detailed Engineering Evaluation

Quantitative Assessment Report



Christchurch City Council

Garden of Tane

Quantitative Assessment Report

Onuku Road, Akaroa, Canterbury

Prepared By



Bogdan Balliu
Structural Engineer, RPEQ

Opus International Consultants Ltd
Christchurch Office
20 Moorhouse Avenue
PO Box 1482, Christchurch Mail
Centre, Christchurch 8140
New Zealand

Reviewed By

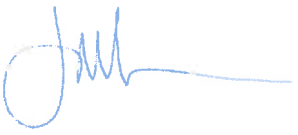


Simon Biggs
Senior Structural Engineer, MIEAust

Telephone: +64 3 363 5400
Facsimile: +64 3 365 7858

Date: February 2013
Reference: 6-QUCC1.42
Status: Final

Approved By



Jan Stanway
Senior Structural Engineer
CPEng 222291

Summary

Garden of Tane
PRK 3742 BLDG 001 EQ2

Detailed Engineering Evaluation
Quantitative Report - Summary
Final

Background

This is a summary of the quantitative assessment report for the Garden of Tane Toilets located at Onuku Rd, Akaroa. The assessment is based on the Detailed Engineering Evaluation Procedure document (draft) issued by the Structural Advisory Group on 19 July 2011 and visual inspections on 8 June 2012. No structural drawings of the structure were available by the time of writing this report.

Key Damage Observed

No structural damage was observed at the time of the inspection.

Critical Structural Weaknesses

No critical structural weaknesses were identified in the structure.

Indicative Building Strength

Based on the limited information available, and from undertaking a quantitative assessment, the building capacity has been assessed to be 96% NBS as limited by the out-of-plane shear capacity of the reinforced concrete masonry bond beams.

The structure has been assessed to have seismic capacity of more than 33%NBS, and is therefore not classed as an earthquake prone building under the NZSEE classification system.

Due to the compliant seismic capacity and lack of observed damage, no further action is recommended.

Contents

Summary	i
1 Introduction.....	1
2 Compliance	1
3 Earthquake Resistance Standards.....	4
4 Building Description	7
5 Survey	7
6 Damage Assessment.....	8
7 General Observations.....	8
8 Detailed Seismic Assessment	8
9 Geotechnical Assessment	10
10 Conclusions.....	10
11 Recommendations	10
12 Limitations.....	10
13 References	11

Appendix A – Photographs

Appendix B – Structural Sketch

Appendix C – CERA DEE Form

1 Introduction

Opus International Consultants Limited has been engaged by Christchurch City Council (CCC) to undertake detailed seismic assessments of the Garden of Tane Toilets building, located at Onuku Road, Akaroa, following the M6.3 Christchurch earthquake on 22 February 2011.

The purpose of the assessment is to determine if the building is classed as being earthquake prone in accordance with the Building Act 2004.

The seismic assessment and reporting have been undertaken based on the quantitative procedures detailed in the Detailed Engineering Evaluation Procedure (DEEP) document (draft) issued by the Structural Engineering Society (SESOC) on 19 July 2011.

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 to carry out a full structural survey before the building is re-occupied.

We understand that CERA 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). CERA have adopted the Detailed Engineering Evaluation Procedure (DEEP) document (draft) issued by the Structural Engineering Society (SESOC) on 19 July 2011. This document sets out a methodology for both initial qualitative and detailed quantitative assessments.

It is anticipated that a number of factors, including the following, will determine the extent of evaluation and strengthening level required:

1. The importance level and occupancy of the building.

2. The placard status and amount of damage.
3. The age and structural type of the building.
4. Consideration of any critical structural weaknesses.

Christchurch City Council requires any building with a capacity of less than 34% of New Building Standard (including consideration of critical structural weaknesses) to be strengthened to a target of 67% as required under the CCC Earthquake Prone Building Policy.

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 the alteration. This effectively means that a building cannot be weakened as a result of an alteration (including partial demolition).

The Earthquake Prone Building policy for the territorial authority shall apply as outlined in Section 2.3 of this report.

Section 115 – Change of Use

This section requires that the territorial authority is satisfied that the building with a new use complies with the relevant sections of the Building Code ‘as near as is reasonably practicable’.

This is typically interpreted by territorial authorities as being 67% of the strength of an equivalent new building or as near as practicable. This is also the minimum level recommended by the New Zealand Society for Earthquake Engineering (NZSEE).

Section 121 – Dangerous Buildings

This section was extended by the Canterbury Earthquake (Building Act) Order 2010, and defines a building as dangerous if:

1. 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
2. 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
3. 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
4. There is a risk that other property could collapse or otherwise cause injury or death; or

5. 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 (EPB) 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 loads 33% of those 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 on 4 September 2010.

The 2010 amendment includes the following:

1. A process for identifying, categorising and prioritising Earthquake Prone Buildings, commencing on 1 July 2012;
2. A strengthening target level of 67% of a new building for buildings that are Earthquake Prone;
3. A timeframe of 15-30 years for Earthquake Prone Buildings to be strengthened; and,
4. 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.

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.

Where an application for a change of use of a building is made to Council, the building will be required to be strengthened to 67% of New Building Standard or as near as is reasonably practicable.

2.4 Building Code

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

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

- increase in the basic seismic design load for the Canterbury earthquake region (Z factor increased to 0.3 equating to an increase of 36 – 47% depending on location within the region);
- Increased serviceability requirements.

2.5 Institution of Professional Engineers New Zealand (IPENZ) Code of Ethics

One of the core ethical values of professional engineers in New Zealand is the protection of life and safeguarding of people. The IPENZ Code of Ethics requires that:

Members shall recognise the need to protect life and to safeguard people, and in their engineering activities shall act to address this need.

- 1.1 *Giving Priority to the safety and well-being of the community and having regard to this principle in assessing obligations to clients, employers and colleagues.*
- 1.2 *Ensuring that responsible steps are taken to minimise the risk of loss of life, injury or suffering which may result from your engineering activities, either directly or indirectly.*

All recommendations on building occupancy and access must be made with these fundamental obligations in mind.

3 Earthquake Resistance Standards

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 loadings are in accordance with the current earthquake loading standard NZS1170.5 [1].

A generally accepted classification of earthquake risk for existing buildings in terms of %NBS that has been proposed by the NZSEE 2006 [2] is presented in Figure 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 required under Act)	Unacceptable	Unacceptable

Figure 1: NZSEE Risk Classifications Extracted from table 2.2 of the NZSEE 2006 AISPBE Guidelines

Table 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).

Table 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

3.1 Minimum and Recommended Standards

Based on governing policy and recent observations, Opus makes the following general recommendations:

3.1.1 Occupancy

The Canterbury Earthquake Order¹ in Council 16 September 2010, modified the meaning of “dangerous building” to include buildings that were identified as being EPB’s. As a result of this, we would expect such a building would be issued with a Section 124 notice, by the Territorial Authority, or CERA acting on their behalf, once they are made aware of our assessment. Based on information received from CERA to date and from the DBH guidance document dated 12 June 2012 [6], this notice is likely to prohibit occupancy of the building (or parts thereof), until its seismic capacity is improved to the point that it is no longer considered an EPB.

3.1.2 Cordoning

Where there is an overhead falling hazard, or potential collapse hazard of the building, the areas of concern should be cordoned off in accordance with current CERA/territorial authority guidelines.

3.1.3 Strengthening

Industry guidelines (NZSEE 2006 [2]) strongly recommend that every effort be made to achieve improvement to at least 67%NBS. A strengthening solution to anything less than 67%NBS would not provide an adequate reduction to the level of risk.

It should be noted that full compliance with the current building code requires building strength of 100%NBS.

3.1.4 Our Ethical Obligation

In accordance with the IPENZ code of ethics, we have a duty of care to the public. This obligation requires us to identify and inform CERA of potentially dangerous buildings; this would include earthquake prone buildings.

¹ This Order only applies to buildings within the Christchurch City, Selwyn District and Waimakariri District Councils authority

4 Building Description



Figure 2: Location of Garden of Tane Toilets

4.1 General

The Garden of Tane Toilets is a single storey building, with reinforced concrete block walls, a timber framed roof with steel roof sheeting, and a plasterboard ceiling.

The building age is unknown but is estimated to be approximately 40 years old.

4.2 Seismic Load Resisting System

Earthquake induced loads are resisted by the reinforced concrete block walls acting as shear walls for in-plane loading. Block walls resist out-of-plane loading by flexure and shear between their base and the top bond beam. The bond beam is laterally restrained at wall corners and at the location of the internal concrete block wall.

5 Survey

A visual inspection was carried out on 8 June 2012.

The building currently has no earthquake rapid assessment placard in place.

No copies of drawings or structural details have been obtained for the building, and no design calculations were available. Our measure up sketches and observations recorded when the site visits were undertaken have been exclusively used to confirm the structural systems, to investigate

potential critical structural weaknesses (CSW) wherever possible, and identify details which required particular attention.

6 Damage Assessment

Following our visual external assessment, we found no damage as a result of the recent earthquake events.

No cracks in the footings were observed. However, intrusive investigations and level surveys have not been undertaken.

7 General Observations

The building has performed well under seismic conditions which would be expected for a single-storey, reinforced concrete block wall and timber roof framed structure. The building is not currently in use.

Due to the non-intrusive nature of the original survey, some connection details could not be confirmed, including connection of bond beams and anchorage of vertical wall reinforcing in the foundations.

8 Detailed Seismic Assessment

8.1 Critical Structural Weaknesses

As outlined in the Critical Structural Weakness and Collapse Hazards draft briefing document, issued by the Structural Engineering Society (SESOC) on 7 May 2011, the term ‘Critical Structural Weakness’ (CSW) refers to a component of a building that could contribute to increased levels of damage or cause premature collapse of the building.

Based on the limited structural details available no critical structural weaknesses have been identified in this building.

8.2 Seismic Coefficient Parameters

The seismic design parameters based on current design requirements from NZS1170.5:2004 and the NZBC clause B1 for this building are:

- Site soil class D, Clause 3.1.3 of NZS 1170.5:2004;
- Site hazard factor, $Z=0.3$, B1/VM1 Clause 2.2.14B of NZS1170.5:2004;
- Return period factor $R_u = 1.0$ from Table 3.5, NZS 1170.5:2004, for an Importance Level 2 structure with a 50 year design life;
- $\mu_{max} = 1.25$ and $S_p = 0.9$, Table 3.2 of NZS4230:2004.

8.3 Detailed Seismic Assessment Results

A summary of the structural performance of the building is shown in the following table. Note that the values given represent the worst performing elements in the building, as these effectively define the building's capacity. Other elements within the building may have significantly greater capacity when compared with the governing elements.

Table 2: Summary of Seismic Performance

Structural Element/System	Failure Mode, or description of limiting criteria	% NBS based on calculated capacity
Partially reinforced and grouted concrete block wall / along	In-plane shear & bending	100%
	Out-of-plane shear & bending	100%
Partially reinforced and grouted concrete block wall / across	In-plane shear & bending	100%
	Out-of-plane shear	99%
	Out-of-plane bending	100%
Reinforced concrete block bond beam / along	Out-of-plane shear	96%
	Out-of-plane bending	100%
Reinforced concrete block bond beam / across	Out-of-plane shear & bending	100%

8.4 Discussion of Results

The assessment analysis has been based on assumed material properties for partially grouted and reinforced Grade C concrete masonry with D12 verticals at wall corners and ends, and as determined by the cover meter survey inspection. The survey was unable to determine the adequacy of vertical reinforcement embedment into the foundations.

The assessment has been done considering the total seismic load (roof and wall self-weight inertial seismic load) equally distributed to the reinforced block walls for in-plane shear and bending, proportional with tributary roof area for each wall. The walls are spanning vertically between the base and the top bond beam. The beam then is considered laterally restrained at ends and at locations of internal concrete block walls, its horizontal seismic reactions being transmitted as an in-plane shear load into the walls at these supports. No roof diaphragm action and no shear distribution proportional with each wall stiffness were assumed, and thus no torsional effects have been accounted for.

As the building has an assessed capacity of more than 67% NBS it is defined as low earthquake risk in accordance with the Building Act 2004.

8.5 Limitations and Assumptions in Results

The observed level of damage suffered by the building was deemed low enough to not affect the capacity. Therefore the analysis and assessment of the building was based on it being in

an undamaged state. There may have been damage to the building that was unable to be observed during assessments that could cause the capacity of the building to be reduced; therefore the current capacity of the buildings may be lower than that stated.

The results have been reported as a %NBS and the stated value is that obtained from our analysis and assessment. Despite the use of best national and international practice in this analysis, this value contains uncertainty due to the many assumptions and simplifications which are made during the assessment. These include:

- Simplifications made in the analysis, including boundary conditions such as foundation fixity;
- Assessments of material strengths based on site inspections;
- The normal variation in material properties which change from batch to batch;
- Approximations made in the assessment of the capacity of each element.

9 Geotechnical Assessment

Due to a lack of observed ground damage, no specific geotechnical assessment has been undertaken for this site. The seismic site parameters used for the structural analysis have been assumed as subsoil Class C, based on geotechnical advice from Opus.

10 Conclusions

- (a) The structure has a seismic capacity of 96% NBS as limited by the out-of-plane shear capacity of the reinforced concrete masonry bond beams, and is therefore not classed as earthquake prone.
- (b) The building is classed a low risk building under the NZSEE classification system, therefore, due to the lack of observed damage, no further action is recommended.

11 Recommendations

If strengthening to 100% NBS or more is deemed desirable, further structural investigations should be undertaken and strengthening design proposals developed.

12 Limitations

- (i) This report is based on an inspection of the structures with a focus on the damage sustained from the 22 February 2011 Canterbury Earthquake and aftershocks only.
- (ii) Our professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practicing in this field at the time.

(iii) This report is prepared for the CCC to assist with assessing remedial works required for council buildings and facilities. It is not intended for any other party or purpose.

13 References

- [1] NZS 1170.5: 2004, *Structural design actions, Part 5 Earthquake actions*, Standards New Zealand.
- [2] NZSEE: 2006, *Assessment and improvement of the structural performance of buildings in earthquakes*, New Zealand Society for Earthquake Engineering.
- [3] Engineering Advisory Group, *Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury, Part 2 Evaluation Procedure*, Draft Prepared by the Engineering Advisory Group, Revision 5, 19 July 2011.
- [4] Engineering Advisory Group, *Guidance on Detailed Engineering Evaluation of Non-residential buildings, Part 3 Technical Guidance*, Draft Prepared by the Engineering Advisory Group, 13 December 2011.
- [5] SESOC, *Practice Note – Design of Conventional Structural Systems Following Canterbury Earthquakes*, Structural Engineering Society of New Zealand, 21 December 2011.

Appendix A – Photographs



Photo 1: General



Photo 2: General



Photo 3: General

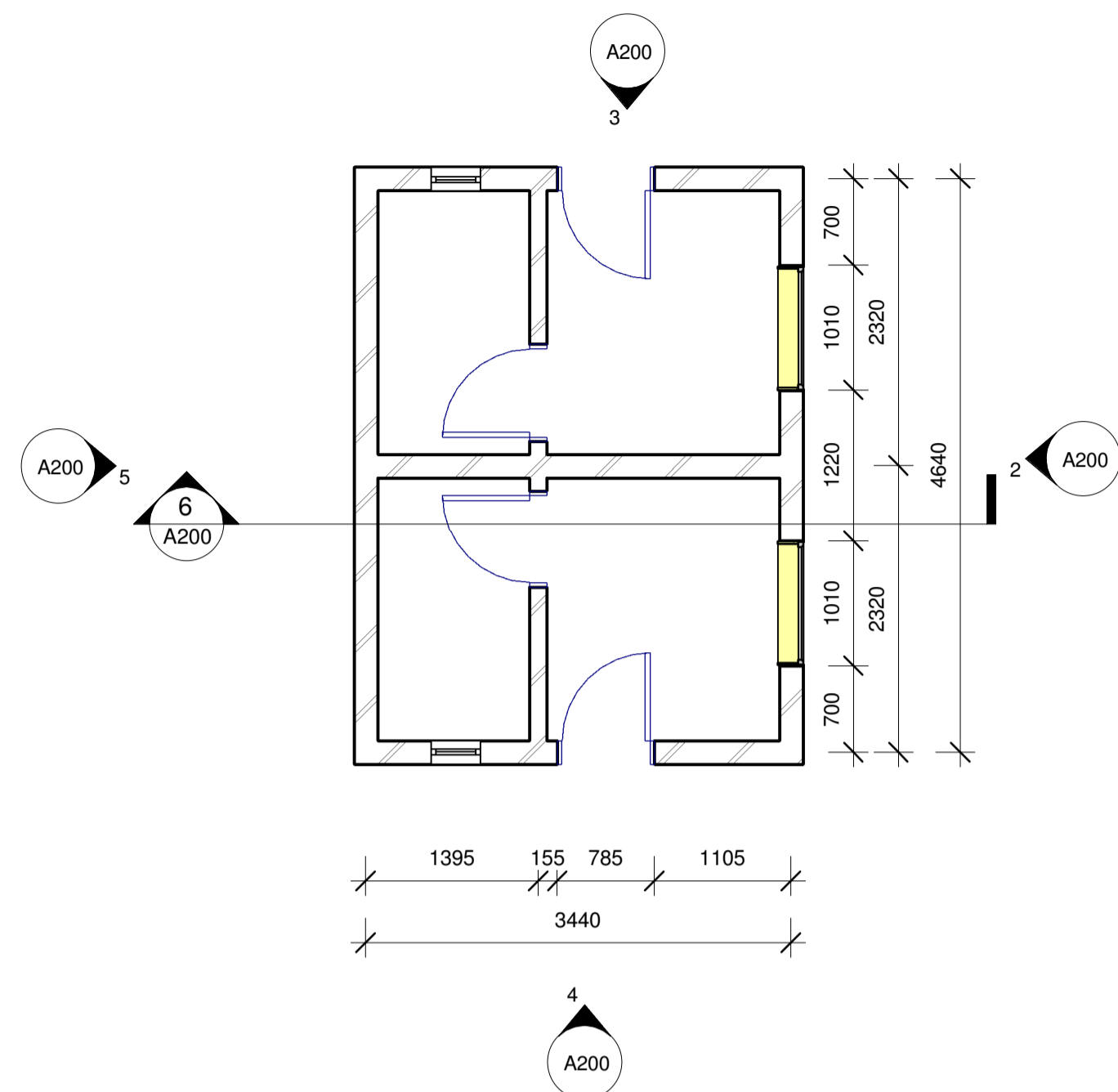


Photo 4: General

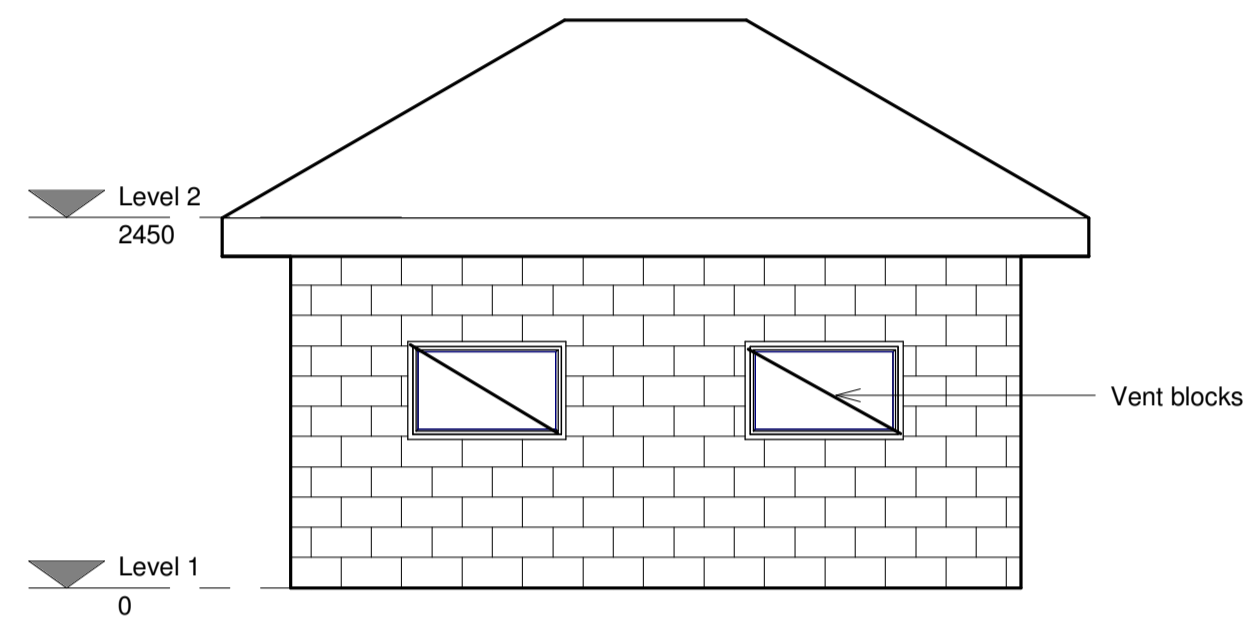


Photo 5: Internal view through window opening

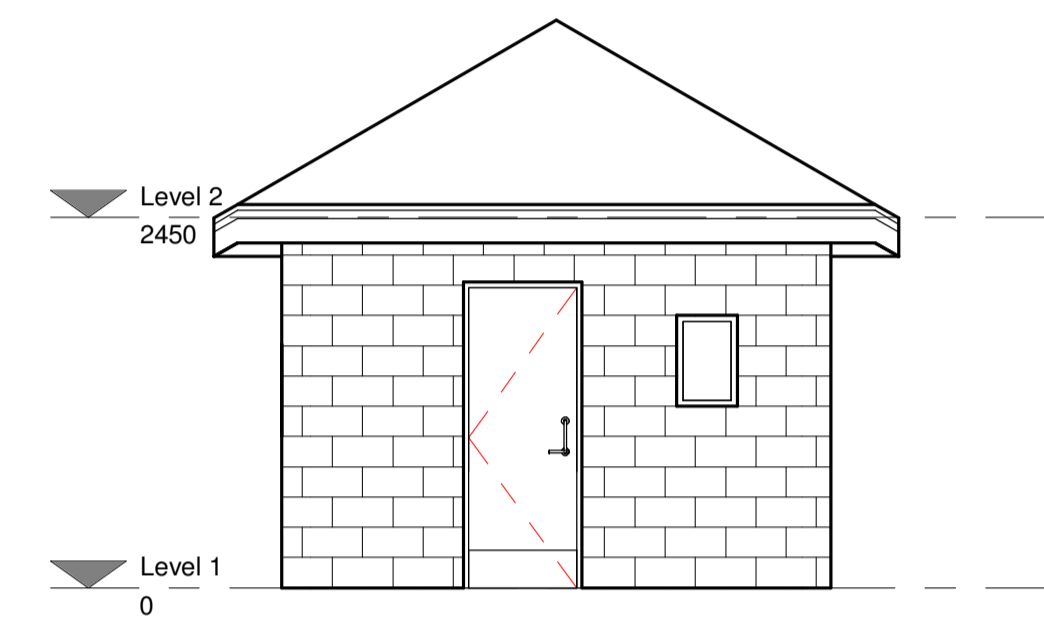
Appendix B – Structural Sketch



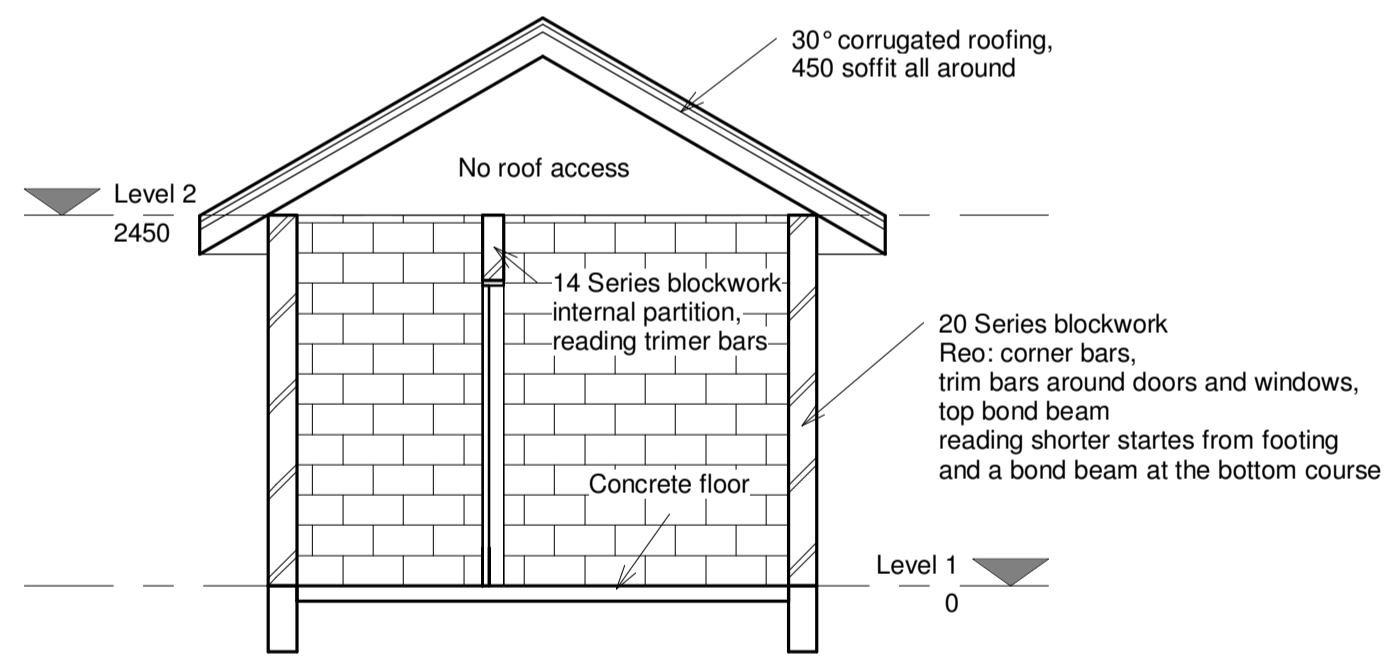
1 Level 1 Plan
A200 1 : 50



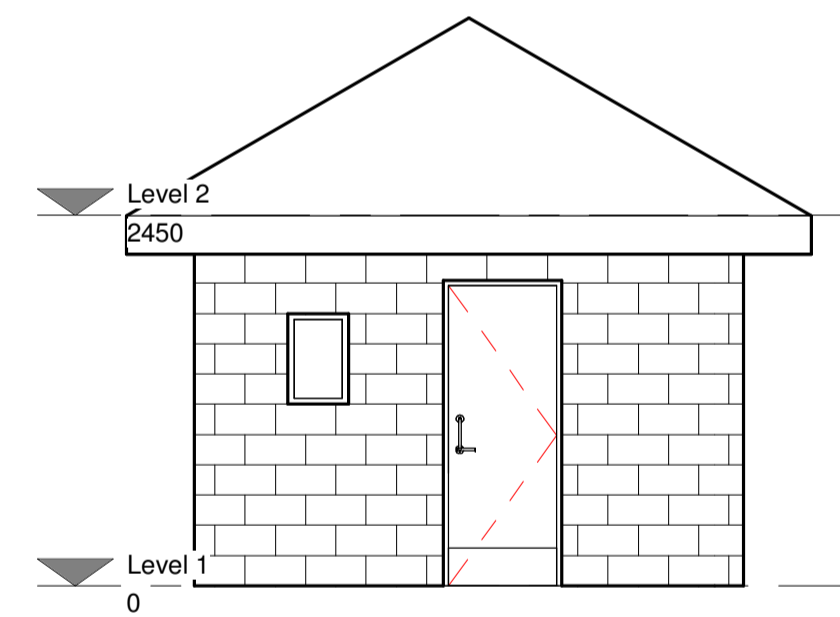
2 East Elevation
A200 1 : 50



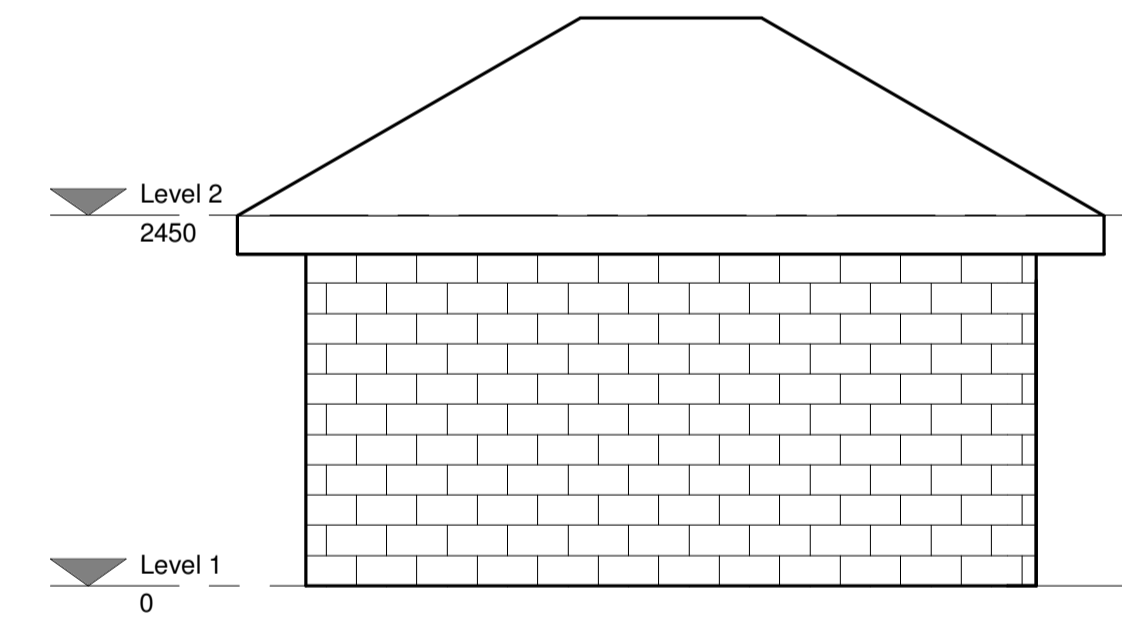
3 North Elevation
A200 1 : 50



6 Section 1
A200 1 : 50



4 South Elevation
A200 1 : 50



5 West Elevation
A200 1 : 50

Draft

Revision	Amendment	Approved	Revision Date

OPUS
Christchurch Office
+64 3 363 5400

Project
CCC
Garden of Tane, Akaroa
Toilet
Title
Existing Floor Plan, Elevations, Section

Drawn	Designed	Approved	Revision Date
A.Senior			

Project No.	Scale
6-QUCC1.39	1 : 50

Drawing No.	Sheet No.	Revision
6/1366/317/8602	A200	RA

Appendix C – CERA DEE Form

Location		Building Name: <input type="text" value="Garden of Tane Toilets"/>	Unit No: <input type="text" value=""/>	Street: <input type="text" value="Onuku Rd, Akaroa"/>	Reviewer: <input type="text" value="Jan Stanway"/>
Building Address: <input type="text" value=""/>	Legal Description: <input type="text" value=""/>				CPEng No: <input type="text" value="222291"/>
			Company: <input type="text" value="Opus International Consultants"/>		
			Company project number: <input type="text" value="GUCC1.42"/>		
			Company phone number: <input type="text" value="03 363 5400"/>		
GPS south: <input type="text" value="43 48 51.42"/>		Degrees		Min	Sec
GPS east: <input type="text" value="172 57 33.55"/>					
Building Unique Identifier (CCC): <input type="text" value="PRK 3742-BLDG-001 EQ2"/>			Date of submission: <input type="text" value="8-Feb-13"/>		
			Inspection Date: <input type="text" value="8/06/2012"/>		
			Revision: <input type="text" value="Final"/>		
			Is there a full report with this summary? <input type="text" value="yes"/>		

Site	Site slope: <input type="text" value="flat"/>	Max retaining height (m): <input type="text" value=""/>
	Soil type: <input type="text" value=""/>	Soil Profile (if available): <input type="text" value=""/>
	Site Class (to NZS1170.5): <input type="text" value=""/>	
	Proximity to waterway (m, if <100m): <input type="text" value=""/>	If Ground improvement on site, describe: <input type="text" value=""/>
	Proximity to cliff top (m, if < 100m): <input type="text" value=""/>	
	Proximity to cliff base (m,if <100m): <input type="text" value=""/>	Approx site elevation (m): <input type="text" value=""/>

Building	No. of storeys above ground: <input type="text" value="1"/>	single storey = 1	Ground floor elevation (Absolute) (m): <input type="text" value=""/>
	Ground floor split?: <input type="text" value="no"/>		Ground floor elevation above ground (m): <input type="text" value=""/>
	Storeys below ground: <input type="text" value="0"/>		
	Foundation type: <input type="text" value="strip footings"/>		if Foundation type is other, describe: <input type="text" value=""/>
	Building height (m): <input type="text" value="2.20"/>	height from ground to level of uppermost seismic mass (for IEP only) (m): <input type="text" value=""/>	
	Floor footprint area (approx): <input type="text" value="14"/>		Date of design: <input type="text" value=""/>
	Age of Building (years): <input type="text" value="40"/>		
	Strengthening present?: <input type="text" value="no"/>		If so, when (year)? <input type="text" value=""/>
	Use (ground floor): <input type="text" value="public"/>		And what load level (%g)? <input type="text" value=""/>
	Use (upper floors): <input type="text" value=""/>		Brief strengthening description: <input type="text" value=""/>
	Use notes (if required): <input type="text" value=""/>		
	Importance level (to NZS1170.5): <input type="text" value="IL2"/>		

Gravity Structure	Gravity System: <input type="text" value="load bearing walls"/>	rafter type, purlin type and cladding: <input type="text" value=""/>
	Roof: <input type="text" value="timber framed"/>	overall depth x width (mm x mm): <input type="text" value=""/>
	Floors: <input type="text" value=""/>	thickness (mm): <input type="text" value="190"/>
	Beams: <input type="text" value="none"/>	
	Columns: <input type="text" value=""/>	
	Walls: <input type="text" value="partially filled concrete masonry"/>	

Lateral load resisting structure	Lateral system along: <input type="text" value="partially filled CMU"/>	Note: Define along and across in detailed report!	note total length of wall at ground (m): <input type="text" value=""/>
	Ductility assumed, μ: <input type="text" value="1.25"/>	##### enter height above at H31	estimate or calculation? <input type="text" value="estimated"/>
	Period along: <input type="text" value="0.30"/>		estimate or calculation? <input type="text" value="estimated"/>
	Total deflection (ULS) (mm): <input type="text" value="1"/>		estimate or calculation? <input type="text" value="estimated"/>
	maximum interstorey deflection (ULS) (mm): <input type="text" value="1"/>		
	Lateral system across: <input type="text" value="partially filled CMU"/>		note total length of wall at ground (m): <input type="text" value=""/>
	Ductility assumed, μ: <input type="text" value="1.25"/>	##### enter height above at H31	estimate or calculation? <input type="text" value="estimated"/>
	Period across: <input type="text" value="0.30"/>		estimate or calculation? <input type="text" value="estimated"/>
	Total deflection (ULS) (mm): <input type="text" value="1"/>		estimate or calculation? <input type="text" value="estimated"/>
	maximum interstorey deflection (ULS) (mm): <input type="text" value="1"/>		

Separations:	north (mm): <input type="text" value=""/>	leave blank if not relevant
	east (mm): <input type="text" value=""/>	
	south (mm): <input type="text" value=""/>	
	west (mm): <input type="text" value=""/>	

Non-structural elements	Stairs: <input type="text" value=""/>	<input type="text" value=""/>
	Wall cladding: <input type="text" value=""/>	<input type="text" value=""/>
	Roof Cladding: <input type="text" value=""/>	<input type="text" value=""/>
	Glazing: <input type="text" value=""/>	<input type="text" value=""/>
	Ceilings: <input type="text" value=""/>	<input type="text" value=""/>
	Services(list): <input type="text" value=""/>	<input type="text" value=""/>

Available documentation	Architectural: <input type="text" value="none"/>	original designer name/date: <input type="text" value=""/>
	Structural: <input type="text" value="none"/>	original designer name/date: <input type="text" value=""/>
	Mechanical: <input type="text" value="none"/>	original designer name/date: <input type="text" value=""/>
	Electrical: <input type="text" value="none"/>	original designer name/date: <input type="text" value=""/>
	Geotech report: <input type="text" value="none"/>	original designer name/date: <input type="text" value=""/>

Damage	Site performance: <input type="text" value="no site disturbance"/>	Describe damage: <input type="text" value=""/>
Site: (refer DEE Table 4-2)	Settlement: <input type="text" value="none observed"/>	notes (if applicable): <input type="text" value=""/>
	Differential settlement: <input type="text" value="none observed"/>	notes (if applicable): <input type="text" value=""/>
	Liquefaction: <input type="text" value="none apparent"/>	notes (if applicable): <input type="text" value=""/>
	Lateral Spread: <input type="text" value="none apparent"/>	notes (if applicable): <input type="text" value=""/>
	Differential lateral spread: <input type="text" value="none apparent"/>	notes (if applicable): <input type="text" value=""/>
	Ground cracks: <input type="text" value="none apparent"/>	notes (if applicable): <input type="text" value=""/>
	Damage to area: <input type="text" value="none apparent"/>	notes (if applicable): <input type="text" value=""/>

Building:	Current Placard Status: <input type="text" value="green"/>	
Along	Damage ratio: <input type="text" value="0%"/>	Describe how damage ratio arrived at: <input type="text" value=""/>
	Describe (summary): <input type="text" value=""/>	
Across	Damage ratio: <input type="text" value="0%"/>	$Damage_Ratio = \frac{(\%NBS\ (before) - \%NBS\ (after))}{\%NBS\ (before)}$
	Describe (summary): <input type="text" value=""/>	
Diaphragms	Damage?: <input type="text" value=""/>	Describe: <input type="text" value=""/>
CSWs:	Damage?: <input type="text" value=""/>	Describe: <input type="text" value=""/>
Pounding:	Damage?: <input type="text" value=""/>	Describe: <input type="text" value=""/>
Non-structural:	Damage?: <input type="text" value=""/>	Describe: <input type="text" value=""/>

Recommendations	Level of repair/strengthening required: <input type="text" value="none"/>	Describe: <input type="text" value=""/>
	Building Consent required: <input type="text" value=""/>	Describe: <input type="text" value=""/>
	Interim occupancy recommendations: <input type="text" value="full occupancy"/>	Describe: <input type="text" value=""/>
Along	Assessed %NBS before e'quakes: <input type="text" value="96%"/>	##### %NBS from IEP below
	Assessed %NBS after e'quakes: <input type="text" value="96%"/>	If IEP not used, please detail assessment methodology: <input type="text" value="Quantitative"/>
Across	Assessed %NBS before e'quakes: <input type="text" value="96%"/>	##### %NBS from IEP below
	Assessed %NBS after e'quakes: <input type="text" value="96%"/>	



Opus International Consultants Ltd
20 Moorhouse Avenue
PO Box 1482, Christchurch Mail Centre,
Christchurch 8140
New Zealand

t: +64 3 363 5400
f: +64 3 365 7858
w: www.opus.co.nz