



*Christchurch City Council*

**Bishopdale Park Toilets  
PRK 0322 BLDG 002 EQ2**

**Detailed Engineering Evaluation**

**Quantitative Assessment Report**





*Christchurch City Council*

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# **Bishopdale Park Toilets Quantitative Assessment Report**

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# Summary

Bishopdale Park Toilets  
PRK 0322 BLDG 002 EQ2

Detailed Engineering Evaluation  
Quantitative Report - SUMMARY  
Final

Bishopdale Park, Harewood Road, Christchurch 8053, New Zealand

## Background

This is a summary of the quantitative report for the Bishopdale Park Toilets. The assessment is based on the Detailed Engineering Evaluation Procedure document (draft) issued by the Structural Advisory Group on 19 July 2011, visual inspections on 27 July 2012. No structural drawings of these structures were available at the time of writing this report.

## Key Damage Observed

No seismic damage was observed at the time of inspection.

## Critical Structural Weaknesses

No potential critical structural weaknesses were identified in the structure.

## Indicative Building Strength

Based on the information available, and from undertaking a quantitative assessment, the building capacity has been assessed to be 67% NBS as limited by the out-of-plane response of the internal unreinforced concrete masonry walls.

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

Due to the compliant %NBS and the lack of observed damage, no further action is necessary for this building.

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# 1 Introduction

Opus International Consultants Limited has been engaged by Christchurch City Council (CCC) to undertake a detailed seismic assessment of the Bishopdale Park Toilets, located within Bishopdale Park, Harewood Road, Christchurch 8053, 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 Order<sup>1</sup> 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.

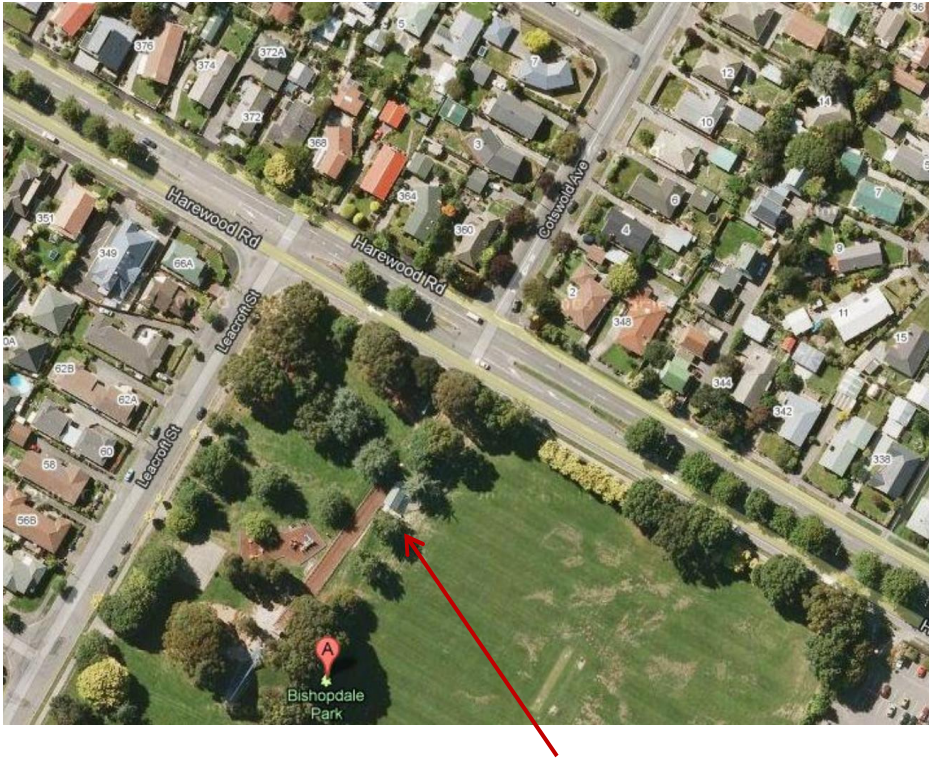
### 3.1.4 Our Ethical Obligation

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.

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

## 4 Building Description



**Figure 2: Location of Bishopdale Park Toilets**

### 4.1 General

The Bishopdale Park Toilet block is a single storey structure with a light timber pitched roof and steel roof sheeting. It has reinforced concrete masonry walls externally, and unreinforced concrete masonry walls internally with timber wall framing from eaves to roof level. The toilets are divided up by these internal walls.

The building is approximately 4.1m wide by 6m long and is situated on a flat site.

### 4.2 Seismic Load Resisting System

Seismic loads to the building are resisted by the concrete masonry walls. The reinforced masonry external walls are supported at the top by the reinforced concrete masonry bond beams and at the bottom by the ground slab and foundations. Load distribution to return walls is by way of the wall bond beams, the flexible roof diaphragm, and walls acting out-of-plane.

## 5 Survey

A visual inspection was carried out on 27 July 2012.

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

No copies of the drawings or design calculations have been obtained for the building. Our measure up sketches and observations recorded when 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

No damage as a result of the recent earthquake events was evident.

No displacements of the foundations or cracks in the footings were observed, but intrusive investigations and level surveys have not been undertaken to confirm this.

## 7 General Observations

The building has performed well under seismic conditions which would be expected for a single-storey, reinforced masonry and light timber roof structure. The building is still 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 potential critical structural weaknesses have been identified in this structure.

### 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 for masonry.

### 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 buildings, as these effectively define the building's capacity. Other elements within the buildings may have significantly greater capacity when compared with the governing elements.

**Table 2: Summary of Seismic Performance**

Structural Element/System	Description/Discussion	% NBS based on calculated capacity
Reinforced external concrete block walls	In- plane shear & bending	>100%
	Out-of-plane shear & bending	>100%
Unreinforced internal concrete block walls	In-plane response	92%
	Out-of-plane response	67%
External reinforced bond beams	Bending & shear	94%
Reinforced concrete block bond beams	Out-of-plane shear	100%

### 8.4 Discussion of Results

This assessment has been based on assumed material properties for fully grouted Grade B concrete masonry and reinforcing. External masonry is reinforced vertically with assumed D12 at 600mm centres as determined by the site cover meter survey. The actual reinforcement bar diameter and steel yield strength were not able to be confirmed without intrusive investigation. This will have a major influence on the calculated capacity (%NBS) of the masonry bond beams and external walls and potentially the final stated %NBS for the building.

The assessment has been based on the following load distribution assumptions:

- The total seismic load is distributed by a combination of diaphragm action of the roof, horizontal spanning of the external bond beams, and out-of-plane flexure of the masonry walls assuming the loads can be transmitted to the return walls via reinforced concrete block bond beams, or nominal roof diaphragm action.

The building has an assessed capacity of 67% NBS thus it is not defined as an earthquake prone building in accordance with the Building Act 2004.

### 8.5 Limitations and Assumptions in Results

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 and assessment, 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 limited drawings, specifications and 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, especially when considering the post-yield behaviour.

## 9 Geotechnical Assessment

Due to a lack of observed ground damage, no specific geotechnical assessment has been undertaken for this site. The site parameters used for the structural analysis have been taken as site subsoil class D, based on geotechnical advice.

## 10 Remedial Options

Although this building has not been damaged in the earthquakes and we have determined that it has adequate seismic capacity, consideration should be given to whether a seismic retrofit would nevertheless be appropriate for the internal unreinforced masonry walls. Additional intrusive investigations of this building could be undertaken to determine the bar diameters for the vertical wall and bond beam reinforcing.

## 11 Conclusions

The structure has a seismic capacity of 67% NBS, and is therefore not classed as an earthquake prone building.

Due to the compliant %NBS and the lack of observed damage, no further action is necessary for this building.

## 12 Limitations

- (a) 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. Some non-structural damage may be mentioned but this is not intended to be a comprehensive list of non-structural items.
- (a) 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.
- (b) 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**



**Bishopdale Park Toilets – Detailed Engineering Evaluation**

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**Photo 1: Side photo – male toilet entry**



**Photo 2: Side photo – female toilet entry**



## Bishopdale Park Toilets – Detailed Engineering Evaluation

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**Photo 3: Eastern side photo**



**Photo 4: Western side photo**



**Photo 5: Exterior ridge detail**

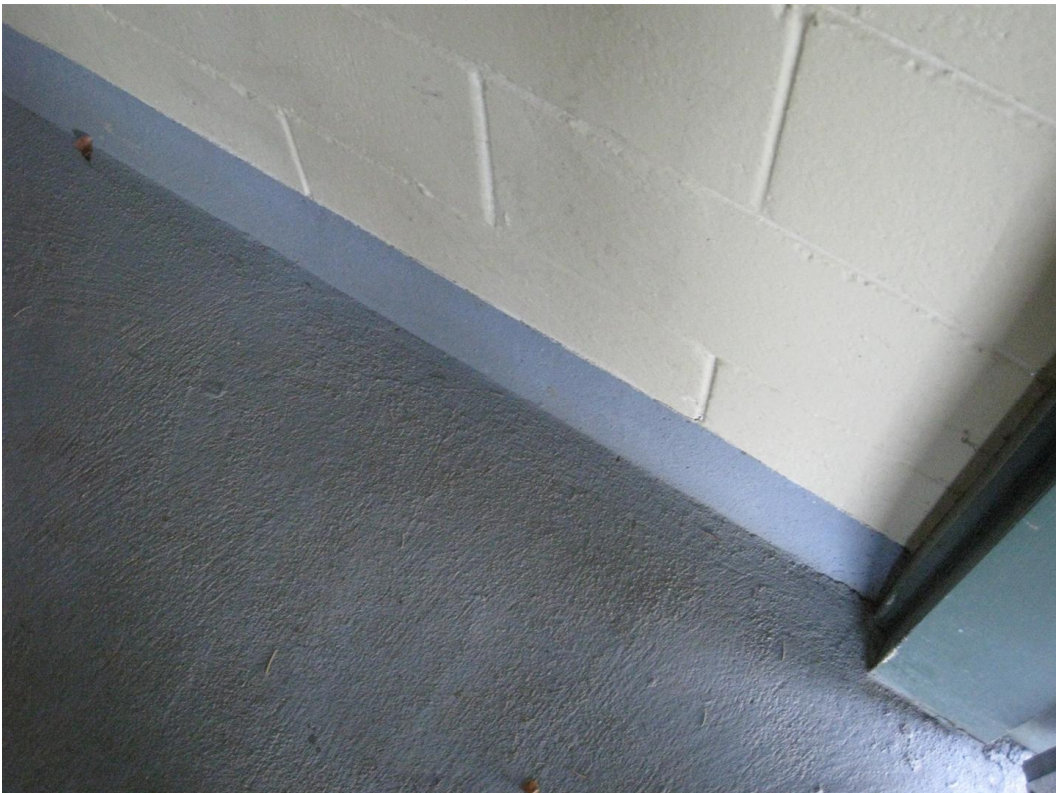


**Photo 6: Interior ridge detail**

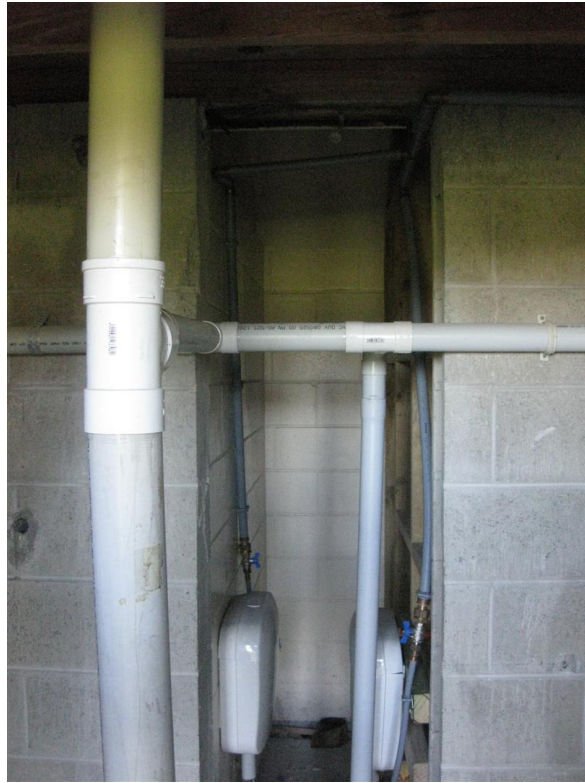




**Photo 7: Eave detail**



**Photo 8: Ground slab at toilet entrance**



**Photo 9: Internal photo in utilities room**



**Photo 10: Timber partition wall on top of concrete block wall**





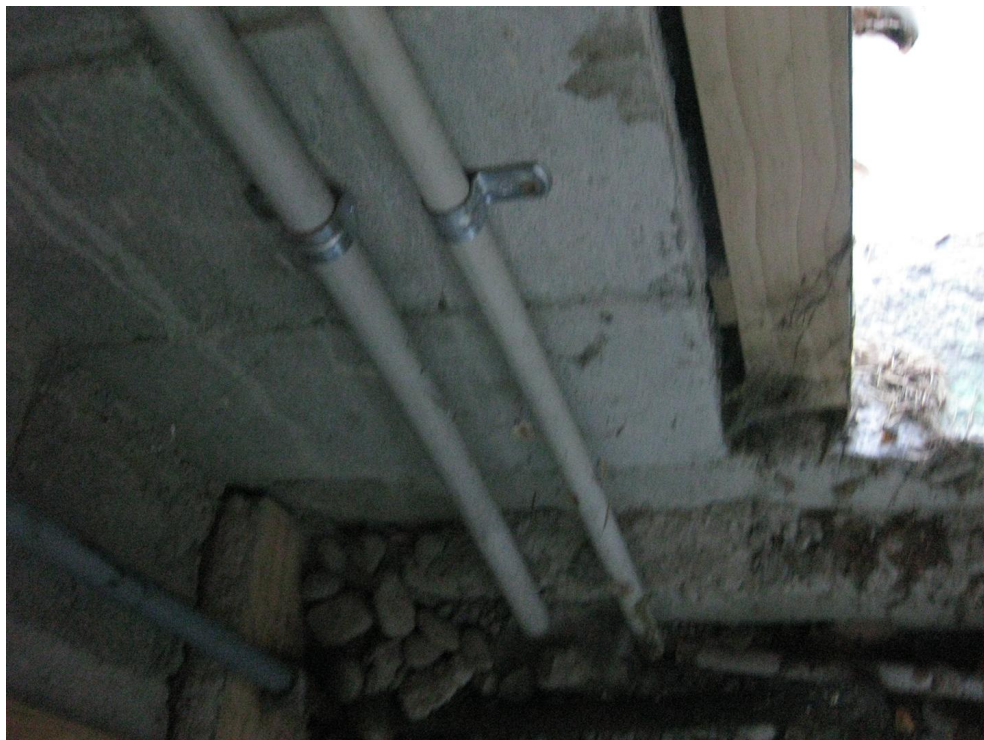
**Photo 11: Internal concrete block and timber partition walls**



**Photo 12: Internal timber partition wall**



**Photo 13: Internal timber to concrete block wall connection**

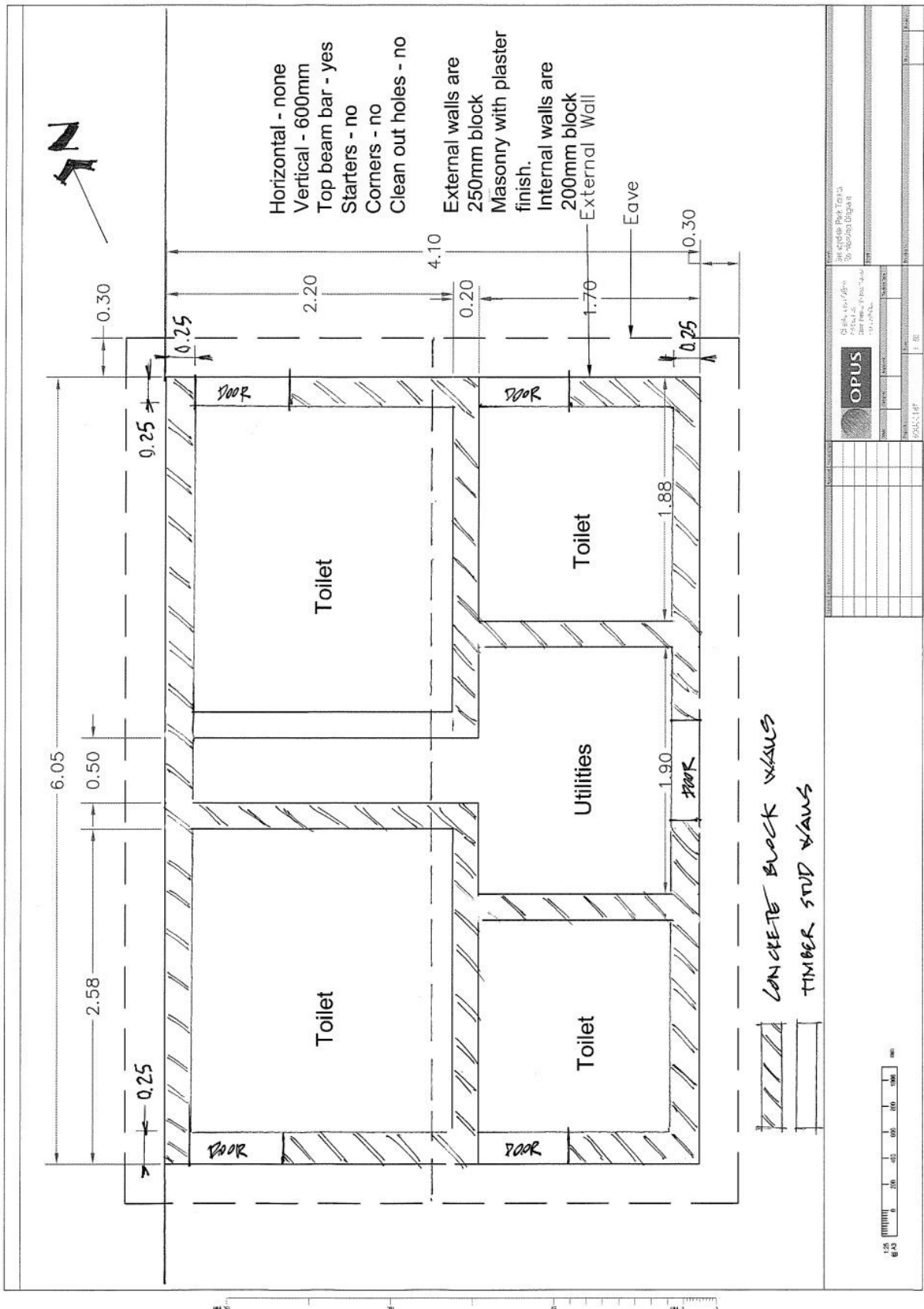


**Photo 14: Corner ground photo**

## **Appendix B – Structural Drawings / Sketches**



# Bishopdale Park Toilets – Detailed Engineering Evaluation



## **Appendix C – CERA DEE Data Sheet**

<b>Location</b>		Building Name: <input type="text" value="Bishopdale Park Toilets"/>	Unit No: <input type="text" value="14"/>	Street: <input type="text" value="Raleigh St, Bishopdale"/>	Reviewer: <input type="text" value="Paul Campbell"/>
Building Address: <input type="text"/>	Legal Description: <input type="text"/>				CPEng No: <input type="text" value="197688"/>
			Company: <input type="text" value="Opus International Consultants"/>		
			Company project number: <input type="text" value="GUCC1.67"/>		
			Company phone number: <input type="text" value="03 363 5400"/>		
GPS south: <input type="text" value="43 29 13.67"/>		Degrees		Min Sec	
GPS east: <input type="text" value="172 35 4.04"/>					
Building Unique Identifier (CCC): <input type="text" value="PRK 0322 BLDG 002 EQ2"/>			Date of submission: <input type="text" value="29-Nov-12"/>		
			Inspection Date: <input type="text" value="27-Jul-12"/>		
			Revision: <input type="text" value="Final"/>		
			Is there a full report with this summary? <input type="text" value="yes"/>		

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

<b>Building</b>		No. of storeys above ground: <input type="text" value="1"/>	single storey = 1	Ground floor elevation (Absolute) (m): <input type="text"/>
Ground floor split? <input type="text" value="no"/>		Ground floor elevation above ground (m): <input type="text"/>		
Storeys below ground: <input type="text" value="0"/>		if Foundation type is other, describe: <input type="text"/>		
Foundation type: <input type="text" value="strip footings"/>		height from ground to level of uppermost seismic mass (for IEP only) (m): <input type="text"/>		
Building height (m): <input type="text" value="2.40"/>		Date of design: <input type="text"/>		
Floor footprint area (approx): <input type="text" value="25"/>				
Age of Building (years): <input type="text" value="20"/>				
Strengthening present? <input type="text" value="no"/>		If so, when (year)? <input type="text"/>		
Use (ground floor): <input type="text" value="public"/>		And what load level (%g)? <input type="text"/>		
Use (upper floors): <input type="text"/>		Brief strengthening description: <input type="text"/>		
Use notes (if required): <input type="text"/>				
Importance level (to NZS1170.5): <input type="text" value="IL2"/>				

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

<b>Lateral load resisting structure</b>		Lateral system along: <input type="text" value="fully filled CMU"/>	<b>Note: Define along and across in detailed report!</b>	note total length of wall at ground (m): <input type="text"/>
Ductility assumed, μ: <input type="text" value="1.25"/>		Period along: <input type="text" value="0.20"/>	##### enter height above at H31	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"/>		estimate or calculation? <input type="text" value="estimated"/>		
Lateral system across: <input type="text" value="fully filled CMU"/>		note total length of wall at ground (m): <input type="text"/>		
Ductility assumed, μ: <input type="text" value="1.25"/>		Period across: <input type="text" value="0.20"/>	##### enter height above at H31	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"/>		estimate or calculation? <input type="text" value="estimated"/>		

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

<b>Non-structural elements</b>		Stairs: <input type="text"/>	describe: <input type="text"/>
Wall cladding: <input type="text"/>		profiled sheet	
Roof Cladding: <input type="text" value="Metal"/>			
Glazing: <input type="text" value="timber frames"/>			
Ceilings: <input type="text" value="none"/>			
Services(list): <input type="text"/>			

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

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

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

<b>Recommendations</b>		Level of repair/strengthening required: <input type="text" value="none"/>	Describe: <input type="text"/>
Building Consent required: <input type="text"/>		Describe: <input type="text"/>	
Interim occupancy recommendations: <input type="text" value="full occupancy"/>		Describe: <input type="text"/>	
Along	Assessed %NBS before e'quakes: <input type="text" value="67%"/>	##### %NBS from IEP below	If IEP not used, please detail assessment methodology: <input type="text" value="Quantitative"/>
	Assessed %NBS after e'quakes: <input type="text" value="67%"/>		
Across	Assessed %NBS before e'quakes: <input type="text" value="67%"/>	##### %NBS from IEP below	
	Assessed %NBS after e'quakes: <input type="text" value="67%"/>		



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