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Heathcote Domain Toilets
PRK 1880 BLDG 005
Detailed Engineering Evaluation
Qualitative Report
Version FINAL

40 Port Hills Rd
Heathcote Valley

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

Heathcote Domain Toilets
PRK 1880 BLDG 005

Detailed Engineering Evaluation
Qualitative Report
Version FINAL

40 Port Hills Rd, Heathcote Valley

Christchurch City Council

Prepared By
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Reviewed By
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Date
20th May 2013

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Heathcote Domain Toilets

PRK 1880 BLDG 005

Detailed Engineering Evaluation

Qualitative Report - SUMMARY

Version FINAL

40 Port Hills Rd, Heathcote Valley

Background

This is a summary of the Qualitative report for the building structure, and is based in part on the Detailed Engineering Evaluation Procedure document (draft) issued by the Structural Advisory Group on 19 July 2011, visual inspections on the 20th of September 2012 and available construction drawings.

Building Description

The structure has been built on a concrete slab supported by strip foundations. Four timber framed perimeter walls form the structures rectangular shape. The southwest timber framed wall has an opening. The timber frame mono-pitch roof is at a slope of 7.5 degrees and is clad with zincalum trimdeck roofing. A pergola extends from the roofs south eastern edge to two timber poles founded in concrete pads.

Key Damage Observed

No damage was observed during the inspection of the structure.

Critical Structural Weaknesses

No critical structural weaknesses have been identified during this assessment.

Indicative Building Strength (from IEP and CSW assessment)

Based on the information available, and using the NZSEE Initial Evaluation Procedure, the original capacity of the building has been assessed to be in the order of 85% NBS and post-earthquake capacity also in the order of 85% NBS. As no critical structural weakness have been identified the Toilets post-earthquake capacity excluding critical structural weaknesses is also in the order of 85% NBS.

The building has been assessed to have a seismic capacity in the order of 85% NBS and is therefore neither potentially Earthquake Risk nor potentially Earthquake Prone.

Recommendations

CCC is not required to undertake a detailed seismic assessment.

1. Background

GHD has been engaged by the Christchurch City Council (CCC) to undertake a detailed engineering evaluation of the Heathcote Domain Toilets.

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

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

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

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

2. Compliance

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

2.1 Canterbury Earthquake Recovery Authority (CERA)

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

Section 38 – Works

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

Section 51 – Requiring Structural Survey

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

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

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

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

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

2.2 Building Act

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

Section 112 – Alterations

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

Section 115 – Change of Use

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

2.2.1 Section 121 – Dangerous Buildings

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

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

Section 122 – Earthquake Prone Buildings

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

Section 124 – Powers of Territorial Authorities

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

Section 131 – Earthquake Prone Building Policy

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

2.3 Christchurch City Council Policy

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

The 2010 amendment includes the following:

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

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

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

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

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

2.4 Building Code

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

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

- 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.

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

Table 1 compares the percentage NBS to the relative risk of the building failing in a seismic event with a 10% risk of exceedance in 50 years (i.e. 0.2% in the next year). It is noted that the current seismic risk in Christchurch results in a 6% risk of exceedance in the next year.

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

Table 1 %NBS compared to relative risk of failure

4. Building Description

4.1 General

The building is located at 40 Port Hills Road, Heathcote Valley. The building was designed in 2004 and no additions have been made. The sole purpose of this building is a public toilet.

The structure is has been built on a concrete slab supported by strip foundations. Four timber framed perimeter walls form the structures rectangular shape. The southwest timber framed wall has a door. With the exception of the southwest wall, all walls have strap cross bracing to provide lateral support. All walls are clad with timber externally and villa board internally.

The timber framed roof is mono-pitched at a slope of 7.5 degrees and is clad with grooved plywood and zincalum trimdeck roofing. A pergola extends from the roofs south eastern edge and is supported by timber poles found into concrete pads.

A 0.8m high stone wall is located on the south eastern face of the building. The wall is connected into the concrete slab through steel reinforcing.

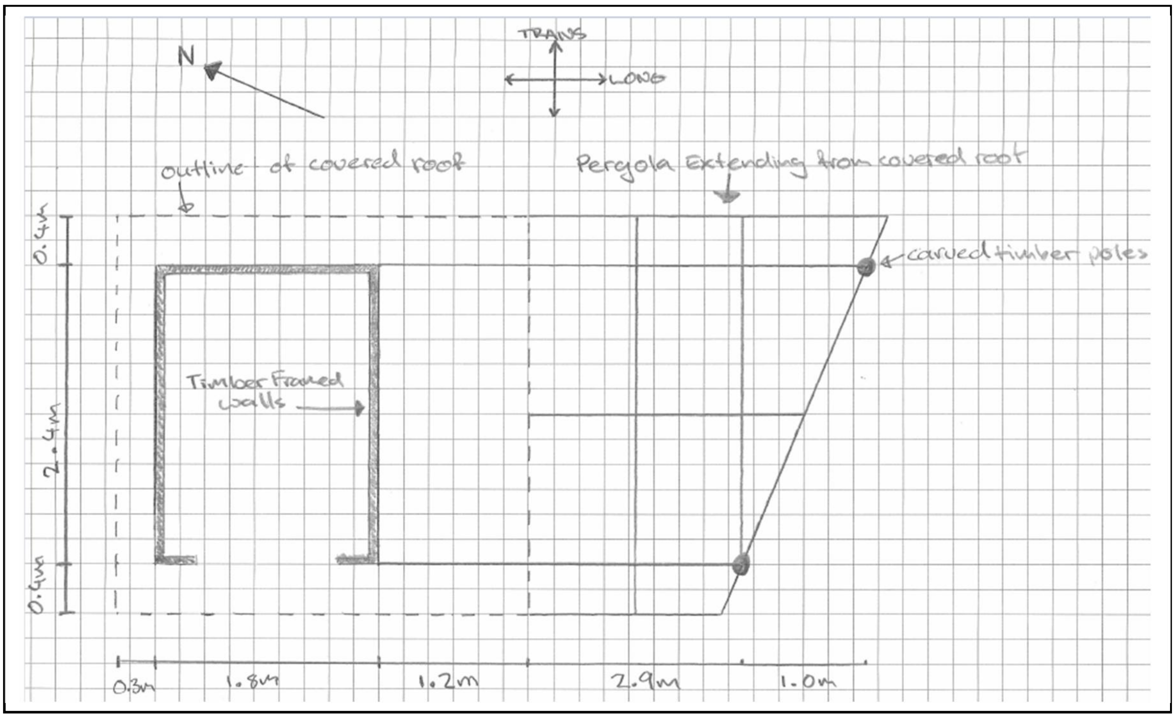

Figure 2 Plan Sketch Showing Key Structural Elements

The toilet block is 2.4m in length by 1.8m in width. The height of the eave at the north-western end is 2.2m. The roof extends over each of the walls to varying degrees (Figure 2). The pergola extends from the roof for up to 3.9 meters. The overall footprint of the building is approximately 11m^2.

The toilet is located 10m to the north of a children's playground and 30m to the east of the neighbouring residential area. The site is flat and is located near no waterways.

Plans for the toilet were available and are shown in Appendices B.

4.2 Gravity Load Resisting System

Roof and pergola gravity loads are supported by the timber framed walls and the timber poles. Gravity roof loads are transferred along the ceiling joists and beams, spanning between the walls and poles, into the each of these elements. The gravity loads are then transferred directly down the timber framed walls and timber poles into their given foundations. The gravity loads are then finally distributed into the ground.

Internal gravity loads are supported directly by the concrete slab, transferred into the strip foundations and distributed into the ground.

4.3 Lateral Load Resisting System

The lateral roof loads in the longitudinal direction are transferred by the diaphragm action of the roof plywood and timber roof frame to the walls in the plane of loading. The panel action and cross bracing in the in-plane walls transfers the lateral roof loads to the concrete floor slab, through the strip foundations, and into the ground. Additional lateral resistance will be provided by the poles.

The lateral load resisting system in the transverse direction is similar to that above. However, the lateral loads produced by the pergola are resisted between the timber frame walls in the plane of loading and the timber poles. The cantilever action of the timber poles transfer the lateral loads into the pile foundations and directly into the ground. The panel action of the in-plane walls transfers the lateral roof loads to the concrete slab, through the strip foundations, and into the ground.

Walls subject to perpendicular lateral loads span between the ground and roof diaphragm.

5. Assessment

An inspection of the building was undertaken on the 20th of September 2012. Both the interior and exterior of the building were inspected. The main structural components of the roof of the building were all able to be viewed. The condition of the timber poles pad foundations was not assessed.

The inspection consisted of scrutinising the building to determine the structural systems and likely behaviour of the building during an earthquake. The site was assessed for damage, including examination of the ground conditions, checking for damage in areas where damage would be expected for the type of structure and noting general damage observed throughout the building in both structural and non-structural elements.

The %NBS score determined for this building has been based on the IEP procedure described by the NZSEE and based on the information obtained from visual observation of the building and available drawings.

5.1 Damage Assessment

5.1.1 Surrounding Buildings

No damage was noted to any of the surrounding buildings.

5.1.2 Residual Displacements and General Observations

No residual displacements of the structure were noticed during our inspection of the building.

5.1.3 Floor Level Survey

No level or verticality surveys have been undertaken for this building at this stage as indicated by Christchurch City Council guidelines.

5.1.4 Ground Damage

There was no evidence of ground damage on the property or surrounding neighbours land.

5.2 Geotechnical Assessment

A desktop report was not undertaken because no evidence of liquefaction or lateral spreading was clearly visible in the aerial photography taken following the September 2010, February 2011, June 2011 or December 2011 earthquakes.

A soil class of D (in accordance with NZS 1170.5:2004) should be adopted for the site due to the following reasons:

- No evidence of liquefaction following earthquakes;
- Anticipated depth to bedrock in excess of 100m.

6. Critical Structural Weakness

6.1 Short Columns

No short columns are present in the structure.

6.2 Lift Shaft

The building does not contain a lift shaft.

6.3 Roof

Roof elements such as grooved plywood, ceiling joists and beams were clearly visible and are expected to span adequately between supports and provide an effective roof diaphragm.

6.4 Staircases

The building does not contain a staircase.

6.5 Site Characteristics

Site characteristics are considered ‘insignificant’ given the absence of liquefaction and lateral spreading.

6.6 Plan Irregularity

There is a stiffness offset when considering lateral loading in the longitudinal direction. However, due to the scale of this offset, the roof diaphragm action and the lateral load resistance offered by the cantilever timbers it is considered an ‘insignificant’ potential in accordance with the NZSEE guidelines.

7. Initial Capacity Assessment

7.1 % NBS Assessment

The building has had its capacity assessed using the Initial Evaluation Procedure based on the information available. The buildings capacity excluding critical structural weaknesses and the capacity of any identified weaknesses are expressed as a percentage of new building standard (%NBS) and are in the order of that shown below in Table 2. These capacities are subject to confirmation by a more detailed quantitative analysis.

Item	%NBS
Building excluding CSW's	86

Table 2 Indicative Building and Critical Structural Weaknesses Capacities based on the NZSEE Initial Evaluation Procedure

Following an IEP assessment, the building has been assessed as achieving 86% New Building Standard (NBS). Under the New Zealand Society for Earthquake Engineering (NZSEE) guidelines the building is considered neither potentially Earthquake Risk nor potentially Earthquake Prone as it acheives greater than 67% NBS. This score has not been adjusted when considering damage to the structure as none was observed.

7.2 Seismic Parameters

The seismic design parameters based on current design requirements from NZS 1170:2002 and the NZBC clause B1 for this building are:

- Site soil class: D, NZS 1170.5:2004, Clause 3.1.3, Soft Soil
- Site hazard factor, Z = 0.3, NZBC, Clause B1 Structure, Amendment 11 effective from 1 August 2011
- Return period factor R_u = 1.0 , NZS 1170.5:2004, Table 3.5, Importance level 2 structure with a 50 year design life.

An increased Z factor of 0.3 for Christchurch has been used in line with requirements from the Department of Building and Housing resulting in a reduced % NBS score.

7.3 Expected Structural Ductility Factor

A structural ductility factor of 2.0 has been assumed based on the lightweight timber framed construction observed and the date of construction.

7.4 Discussion of Results

The results obtained from the initial IEP assessment are consistent with those expected for a building of this age and construction type. The building was designed in 2004, and was likely designed to the loading standard current at the time, NZS 4203:1992. The design loads used in accordance with this standard are likely to have been less than those required by the current loading standard. When combined with the increase in the hazard factor for Christchurch to 0.3, it would be expected that the building would not achieve 100% NBS. However, due to the lack of any Critical Structural Weaknesses and the presence of adequate bracing it is reasonable to expect the building to be classified as neither potentially Earthquake Prone nor potentially Earthquake Risk.

8. Conclusions & Recommendations

The building has been assessed to have a seismic capacity in the order of 86% NBS and is therefore not considered potentially Earthquake Prone nor potentially Earthquake Risk.

The recent seismic activity in Christchurch has caused no visible damage to the building. As the building suffered no damage that would compromise the load resisting capacity of the existing structural systems and has achieved between greater than 67% NBS following an initial IEP assessment of the building, no further assessment is required by Christchurch City Council to comply with the building act.

9. Limitations

9.1 General

This report has been prepared subject to the following limitations:

- No intrusive structural investigations have been undertaken.
- No intrusive geotechnical investigations have been undertaken.
- Visual inspections of foundations could not be completed.
- No level or verticality surveys have been undertaken.
- No material testing has been undertaken.
- No calculations, other than those included as part of the IEP in the CERA Building Evaluation Report, have been undertaken. No modelling of the building for structural analysis purposes has been performed.

It is noted that this report has been prepared at the request of Christchurch City Council and is intended to be used for their purposes only. GHD accepts no responsibility for any other party or person who relies on the information contained in this reportrite a specific limitations section.

Appendix A

Photographs

Photograph 1 Soutwest elevation

Photograph 2 View of the toilet from the northwest.

Photograph 3 View of the toilet from the south with pergola in front.

Photograph 4 Toilets interior.

Photograph 5 Sun roof and timber beams.

Photograph 6 Paint peeling at villa board lining joints.

Photograph 7 Stonewall at southeast face of the building

Appendix B

Existing Drawings

ISSUE	AMENDMENTS	SIGNED	DATE

CITYSOLUTIONS

		NAME	SIGNED	DATE
DATUM	DESIGNED	David S.		1/12/04
BENCH MK.	DES. REVIEW	[illegible]		
SURVEY FB	DRAWN			
SURVEY LB	DRW. CHECK			
CONSTN. EB				
CONSTN. LB				
SDR FILE				

APPROVED

DATE / /

CLIENT

CHRISTCHURCH
CITY COUNCIL · YOUR PEOPLE · YOUR CITY

PROJECT TITLE

New public toilet & landscaping to Heathcote Domain for Greenspace Unit 2004.

DRAWING TITLE

Working dwg's

FILE NUMBER 562/1228

CONTRACT NUMBER 04/05-141

ORIGINAL SHEET SIZE A1

SCALES as shown

DRAWING & PROJECT NUMBER

SHEET A1 of 4. (A1, A2, A2 & 3)

Appendix C

CERA Building Evaluation Form

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Heathcote Domain Toilets	Reviewer:	Stephen Lee
	Unit / No: / Street	CPEng No:	1006840
Building Address:	40 Port Hills Road	Company:	GHD
Legal Description:	RES 4946 0.9383	Company project number:	513090267
		Company phone number:	04 472 0799
	Degrees / Min / Sec		
GPS south:	43 / 34 / 47.00	Date of submission:	20-05-13
GPS east:	172 / 42 / 25.00	Inspection Date:	20-09-12
		Revision:	FINAL
Building Unique Identifier (CCC):	PRK 1880 BLDG 005	Is there a full report with this summary?	yes

Site

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

Building

No. of storeys above ground:		single storey = 1	Ground floor elevation (Absolute) (m):
Ground floor split?	no	Ground floor elevation above ground (m):	
Storeys below ground			
Foundation type:	strip footings	if Foundation type is other, describe:	
Building height (m):	2.60	height from ground to level of uppermost seismic mass (for IEP only) (m):	2.6
Floor footprint area (approx):	11		
Age of Building (years):	8	Date of design:	1992-2004
Strengthening present?	no	If so, when (year)?	
		And what load level (%g)?	
Use (ground floor):	public	Brief strengthening description:	
Use (upper floors):			
Use notes (if required):	Public Toilet		
Importance level (to NZS1170.5):	IL2		

Gravity Structure

Gravity System:	load bearing walls		
Roof:	timber framed	rafter type, purlin type and cladding	
Floors:	concrete flat slab	slab thickness (mm)	100 RC Slab --- 100 plaster topping
Beams:	timber	type	
Columns:	timber	typical dimensions (mm x mm)	
Walls:			

Lateral load resisting structure

Note: Define along and across in detailed report!

Lateral system along:	lightweight timber framed walls		
Ductility assumed, μ:	2.00	note typical wall length (m)	
Period along:	0.40 (0.00)	estimate or calculation?	estimated
Total deflection (ULS) (mm):		estimate or calculation?	
maximum interstorey deflection (ULS) (mm):		estimate or calculation?	
Lateral system across:	lightweight timber framed walls		
Ductility assumed, μ:	2.00	note typical wall length (m)	
Period across:	0.40 (0.00)	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:	other light	describe	Timber
Roof Cladding:	Metal	describe	Colour Zincalum Trimdeck Roofing
Glazing:			
Ceilings:	none		
Services(list):			

Available documentation

Architectural	full	original designer name/date	
Structural	none	original designer name/date	
Mechanical	none	original designer name/date	
Electrical	none	original designer name/date	
Geotech report	none	original designer name/date	

Damage

Site: (refer DEE Table 4-2)

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

Building:

	Current Placard Status:			
Along	Damage ratio:	0%	Describe how damage ratio arrived at:	
	Describe (summary):			
Across	Damage ratio:	0%		
	Describe (summary):			
Diaphragms	Damage?:	no	Describe:	
CSWs:	Damage?:	no	Describe:	
Pounding:	Damage?:	no	Describe:	
Non-structural:	Damage?:	no	Describe:	

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

Recommendations

	Level of repair/strengthening required:	none	Describe:	
	Building Consent required:		Describe:	
	Interim occupancy recommendations:	full occupancy	Describe:	
Along	Assessed %NBS before e'quakes:	85%	85% %NBS from IEP below	If IEP not used, please detail assessment methodology:
	Assessed %NBS after e'quakes:	85%		
Across	Assessed %NBS before e'quakes:	85%	85% %NBS from IEP below	
	Assessed %NBS after e'quakes:	85%		

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: 2.6m

Seismic Zone, if designed between 1965 and 1992: B

not required for this age of building: D soft soil

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:	22.3%	22.3%

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

	along	across
Final $(\%NBS)_{nom}$:	**22%**	**22%**

2.2 Near Fault Scaling Factor

Near Fault scaling factor, from NZS1170.5, cl 3.1.6: 1.00

	along	across
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

2.5 Ductility Scaling Factor

	along	across
Assessed ductility (less than max in Table 3.2)	2.00	2.00
Ductility scaling factor: =1 from 1976 onwards; or $=k_\mu$, if pre-1976, fromTable 3.3:	1.00	1.00
Ductiity Scaling Factor, **Factor D**:	1.00	1.00

2.6 Structural Performance Scaling Factor:

	along	across
Sp:	0.700	0.700
Structural Performance Scaling Factor **Factor E**:	1.428571429	1.428571429

2.7 Baseline %NBS, $(NBS\%)_b = (\%NBS)_{nom} \times A \times B \times C \times D \times E$

	along	across
$\%NBS_b$:	**85%**	**85%**

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

Table for selection of D1	Severe	Significant	Insignificant/none
Separation	0<sep<.005H	.005<sep<.01H	Sep>.01H
Alignment of floors within 20% of H	**0.7**	**0.8**	**1**
Alignment of floors not within 20% of H	**0.4**	**0.7**	**0.8**

Table for Selection of D2	Severe	Significant	Insignificant/none
Separation	0<sep<.005H	.005<sep<.01H	Sep>.01H
Height difference > 4 storeys	0.4	0.7	1
Height difference 2 to 4 storeys	0.7	0.9	1
Height difference < 2 storeys	1	1	1

3.5. Site Characteristics insignificant 1

3.6. Other factors, Factor F

	Along	Across
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

	along	across
3.7. Overall Performance Achievement ratio (PAR)	**1.00**	**1.00**
4.3 PAR x (%NBS)b: PAR x Baselline %NBS:	**85%**	**85%**
4.4 Percentage New Building Standard (%NBS), (before)		**85%**

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