CLIENTS | PEOPLE | PERFORMANCE

Halswell Quarry - Toilet
PRK 1887 BLDG 005
Detailed Engineering Evaluation
Qualitative Report
Version FINAL

Kennedys Bush Road

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

Halswell Quarry - Toilet
PRK 1887 BLDG 005

Detailed Engineering Evaluation
Qualitative Report
Version FINAL

Kennedys Bush Road

Christchurch City Council

Prepared By
Simon Barker

Reviewed By
Stephen Lee

Date
20^{th} May 2013

Contents

Table Index

Figure Index

Appendices

Qualitative Report Summary

Halswell Quarry Toilets

PRK 1887 BLDG 007

Detailed Engineering Evaluation

Qualitative Report - Summary

Version FINAL

Kennedys Bush Road

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 the 19th July 2011, visual inspections on 20th of September 2012, and available construction drawings.

Building Description

The structure is founded on strip foundations which support a concrete floor slab. Lightweight timber framed perimeter walls extend from the concrete slab to eave level. Timber framed partition walls split the structure into three cubicles. The roof in the southern section is framed by timber trusses and is connected to the northern sections roof. The northern sections roof is timber framed and mono-pitched at a slope of 12 degrees. Both roofs have with timber boards spanning the longitudinal direction. The entire roof is clad with corrugated steel roofing.

Key Damage Observed

No damage was observed that is thought to affect the structural integrity of the toilet.

Critical Structural Weaknesses

No critical structural weaknesses have been identified in the structure.

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 86% NBS and post-earthquake capacity also in the order of 86% NBS. As no critical structural weaknesses have been identified the buildings post-earthquake capacity excluding remains at 86% NBS.

The building has been assessed to have a seismic capacity in the order of 86% NBS and is therefore considered neither potentially Earthquake Risk nor potentially Earthquake Prone.

Recommendations

No further assessment is required.

1. Background

GHD has been engaged by the Christchurch City Council (CCC) to undertake a detailed engineering evaluation of the Halswell Quarry 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	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 in Halswell Quarry Park which can be accessed off Kennedys Bush Road. It is used as a public toilet for visitors of the Christchurch Park. The original toilet was constructed in 1994 with an additional section added in to the north in 1999.

The original structure is found on strip foundations which supports a concrete floor slab. Lightweight timber framed perimeter walls extend from the concrete slab to eave level at 2.2m which forms a rectangular structure. A timber framed partition wall extends to the roof, forming two cubicles. The southern elevation has two doors opening. Timber trusses spaced at approximately 700 support timber boards which are clad with corrugated steel roofing.

The existing slab and foundations have been extended and an additional section has been built to the north of the existing structure. Timber framed walls have been added to form the shaded layout seen below. The walls extend up to a timber framed roof single pitched at 12 degrees. The northern and eastern perimeter walls have diagonal steel bracing providing additional lateral support. Similarly to the original roof the rafters support timber boards spanning the longitudinal direction and are clad with corrugated steel roofing. There are two sky lights creating openings in the new roof.

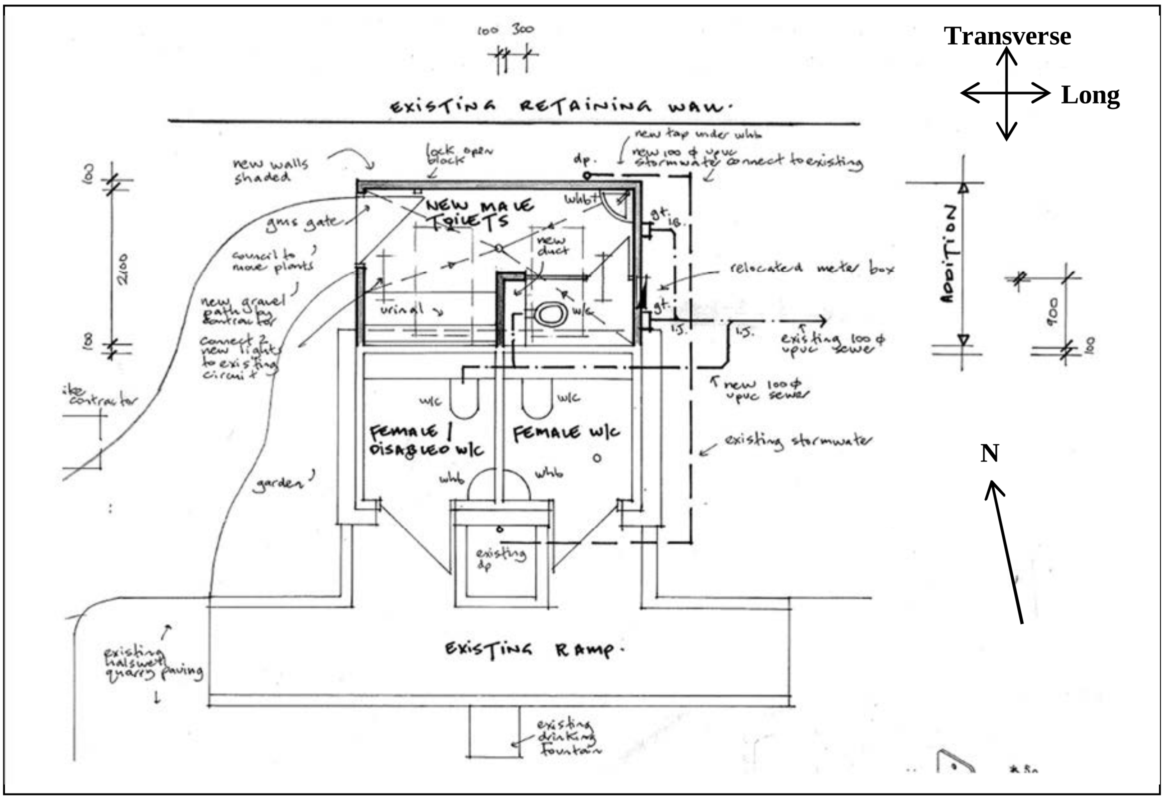


Figure 2 Plan Sketch Showing Key Structural Elements

The plans do not reflect an additional roof section built over the entranceway of the additional section. The additional section has been extended 1.5m to the west with the timber framed wall extending to the south elevation. This section of roof cantilevers over this area (see photograph 3).

The walls of the building are clad externally with timber boards, except for the original building where the first meter has been clad with a stone veneer.

The structure has a plan area of approximately 20m^2, with its apex and eave standing 3.6 meters and 2.2 meters above ground level respectively. The structure is relatively isolated and there are no near waterways; it is built on a level site. A 2.2 meter high retaining wall is located to the north of the building.

Construction plans of the original structure and the addition were available.

4.2 Gravity Load Resisting System

Gravity roof loads are initially carried by the timber roof structure. The timber boards collect the gravity roof loads and transfer these to the trusses and rafters which are supported on the timber framed walls. The timber framed walls then transfer the gravity loads downward into the strip foundations. The strip foundations finally distribute the loads into the ground.

Internal floor gravity loads are transferred through the concrete slab and distributed directly into the ground.

4.3 Lateral Load Resisting System

Lateral load resisting systems in the longitudinal and transverse direction are similar; however, the original and additional sections of the building are slightly different.

Both sections have roof structures that will provide diaphragm action to carry the lateral loads to the timber framed walls in-plane. The panel action provided by the in-plane walls will transfer the lateral loads through the walls into the concrete foundation, and finally into the ground.

The northern section also has diagonal steel bracing running in its timber walls. These braces will assist in carrying the lateral in plane loads from the roof through to the concrete slab.

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

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. However, the strip foundations were unable to be viewed as these lie below ground level.

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

There were no other buildings nearby.

5.1.2 Residual Displacements and General Observations

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

Cracking was noted to the paint in joint locations in the addtional section of the building. See photograph 6. These cracks are not considered to be structurally significant however, they may indicate possible movement.

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 IEP Damage Assessment

The damage that has occurred has not reduced the overall lateral load resistance of the building. Therefore for the purposes of the IEP assessment of the building and the determination of the overall strength score, the effects of this damage on the performance of the building has not reduced the overall strength of the building.

5.3 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 C (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 shallow bedrock beneath loess or loess colluvium.

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 timber boards, rafters and trusses were clearly visible and are expected to provide bracing to the roof structure. See photographs 4 & 7.

6.4 Staircases

The building does not contain a staircase.

6.5 Site Characteristics

The site characteristics have been given an insignificant potential due to the absence of liquefaction and lateral spreading.

6.6 Plan Irregularity

Despite stiffness offsets in both the longitudinal and transverse directions, a critical structural weakness is not considered 'significant' given the scale and lightweight nature of the building.

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 is expressed as a percentage of new building standard (%NBS) and is 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 Earthquake Risk nor Earthquake Prone as it achieves greater than 67% NBS. This score has not been adjusted when considering damage to the structure as any damage observed was relatively minor and considered unlikely to adversely affect the load carrying capacity of the structural systems.

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: C, NZS 1170.5:2004, Clause 3.1.3, Shallow 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 timber framed system 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. Both the original structure and additions were built in the 1990's and likely designed to the loading standard current at the time, NZS 4203:1992. The design loads used in 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. Due to the lack of any Critical Structural Weaknesses and the presence of 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 potentially Earthquake Prone nor Potentially Earthquake Risk.

The recent seismic activity in Christchurch has only caused little or no damage to the building, with minor cracking in the paint finish at joints the only damage noted. As the building suffered insignificant damage that would not compromise the load resisting capacity of the existing structural systems and has achieved 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 the foundations were not undertaken as these were below ground level.
- 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.

9.2 Geotechnical Limitations

This report presents the results of a geotechnical appraisal prepared for the purpose of this commission, and solely for the use of Christchurch City Council and their advisors. The data and advice provided herein relate only to the project and structures described herein and must be reviewed by a competent geotechnical engineer before being used for any other purpose. GHD Limited (GHD) accepts no responsibility for other use of the data.

The advice tendered in this report is based on a visual geotechnical appraisal. No subsurface investigations have been conducted. An assessment of the topographical land features have been made based on this information. It is emphasised that Geotechnical conditions may vary substantially across the site from where observations have been made. Subsurface conditions, including groundwater levels can change in a limited distance or time. In evaluation of this report cognisance should be taken of the limitations of this type of investigation.

An understanding of the geotechnical site conditions depends on the integration of many pieces of information, some regional, some site specific, some structure specific and some experienced based. Hence this report should not be altered, amended or abbreviated, issued in part and issued incomplete in any way without prior checking and approval by GHD. GHD accepts no responsibility for any circumstances, which arise from the issue of the report, which have been modified in any way as outlined above.

Appendix A
Photographs

Photograph 1 Southern Elevation

Photograph 2 Western Elevation

Photograph 3 Cantilevered Roof over entrance to the addition (section not shown in plans)

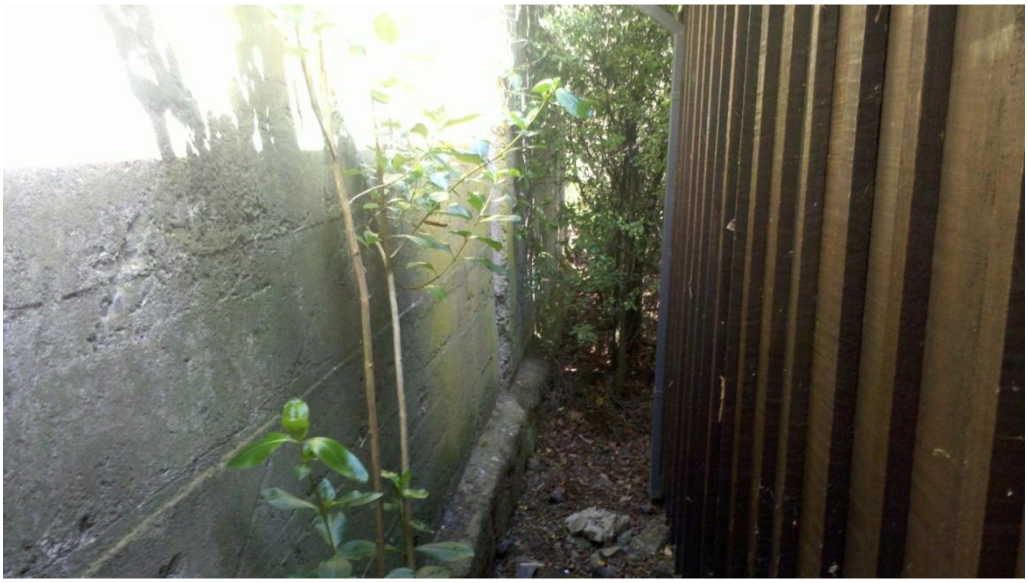
Photograph 4 Timber truss and boards inside original structure.

Photograph 5 Stone Veneer

Photograph 6 Vertical crack in paint finish between adjacent walls.

Photograph 7 Interior of the additional structure.

Photograph 8 Additional roof section meeting orginal section.



Photograph 9 Retaining wall

Appendix B

Existing Drawings

COPYRIGHT CHRISTCHURCH CITY COUNCIL

CONTRACTOR TO CONFIRM ALL DIMENSIONS ON SITE

ISSUE	AMENDMENTS	DATE

CITY DESIGN

CHRISTCHURCH THE GARDEN CITY *The city that shines* ®

	INITIALS	DATE	
DESIGNED	SMG	23/6/99	DATUM
DRAWN	"	"	BENCH MK.
TRACED	"	"	SURVEY FB
DRW. CHK.	"	"	SURVEY LB
DES. CHK.			CONSTN. FB
INDEXED			CONSTN. LB

APPROVED 16/8/99 DATE

CITY DESIGN MANAGER

JOB TITLE

HALSWELL QUARRY ADDITION TO EXISTING TOILETS & NEW PICNIC AREA PUBLIC TOILETS

DRAWING TITLE

ADDITION TO EXISTING PUBLIC TOILET AT MAIN CAR PARK

SCALES

as shown

C.N. 99/2000-88

510-99

SHEET A1. OF 2.

27998/762

DESIGN SERVICES UNIT		INITIALS	DATE		
CHRISTCHURCH THE GARDEN CITY *The city that shines*	DESIGNED		1/6/94	DATUM	
	DRAWN			BENCH MK.	
	TRACED		1/6/94	SURVEY FB	
	DRW. CHK.	A.F.H.	17/8/94	SURVEY LB	
	DES. CHK.			CONSTN. FB	
	INDEXED			CONSTN. LB	

APPROVED: 22/8/94 DATE — DESIGN SERVICES MANAGER

JOB TITLE: HALSWELL QUARRY PUBLIC TOILET for PARKS UNIT 94.

DRAWING TITLE: CONSTRUCTION / CONTRACT DWG.

SCALES

C.N. 94/95-84

507.93

SHEET 1 OF 1

Appendix C

CERA Building Evaluation Form

Detailed Engineering Evaluation Summary Data V1.11

Location

Building Name:	Halswell Quarry Toilets			Reviewer:	Stephen Lee
	Unit	No:	Street	CPEng No:	1006840
Building Address:	Kennedys Bush Rd			Company:	GHD
Legal Description:				Company project number:	51/30902/69
				Company phone number:	04 472 0799
	Degrees	Min	Sec		
GPS south:	43	35	59.00	Date of submission:	10/26/2012
GPS east:	172	34	40.00	Inspection Date:	9/20/2012
				Revision:	
Building Unique Identifier (CCC):	PRK_1887_BLDG_005			Is there a full report with this summary?	yes

Site

Site slope:	flat	Max retaining height (m):	2.2
Soil type:		Soil Profile (if available):	
Site Class (to NZS1170.5):	C		
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:	1	single storey = 1	Ground floor elevation (Absolute) (m):	
Ground floor split?	no		Ground floor elevation above ground (m):	
Storeys below ground	0			
Foundation type:	other (describe)		if Foundation type is other, describe:	Slab on Grade
Building height (m):	3.55		height from ground to level of uppermost seismic mass (for IEP only) (m):	
Floor footprint area (approx):	20			
Age of Building (years):	18		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:	other (note)	describe sytem	
Beams:			Strip Foundation
Columns:			
Walls:			

Lateral load resisting structure

Lateral system along:	lightweight timber framed walls		**Note: Define along and across in detailed report!**		
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:

north (mm):		leave blank if not relevant
east (mm):		
south (mm):		
west (mm):		

Non-structural elements

Stairs:			
Wall cladding:	other light	describe	Timber boards/ masonry veneer
Roof Cladding:	Metal	describe	Profiled Sheeting
Glazing:			
Ceilings:	none		
Services(list):			

Available documentation

Architectural	none	original designer name/date	
Structural	partial	original designer name/date	Design Services/99 City Design/94
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?:	yes	Describe: Cracking in paint finsh.

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

Recommendations

	Level of repair/strengthening required:	none		Describe:
	Building Consent required:	no		Describe:
	Interim occupancy recommendations:	full occupancy		Describe:
Along	Assessed %NBS before e'quakes:	86%	86% %NBS from IEP below	If IEP not used, please detail assessment methodology:
	Assessed %NBS after e'quakes:	86%		
Across	Assessed %NBS before e'quakes:	86%	86% %NBS from IEP below	
	Assessed %NBS after e'quakes:	86%		

IEP **Use of this method is not mandatory - more detailed analysis may give a different answer, which would take precedence. Do not fill in fields if not using IEP.**

Period of design of building (from above): 1992-2004

h_n from above: m

Seismic Zone, if designed between 1965 and 1992: B

not required for this age of building: C shallow 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:	22.7%	22.7%

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 $(\%NBS)_{nom}$:	**23%**	**23%**

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 =kμ, 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:

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

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

$\%NBS_b$:	**86%**	**86%**

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

3.1. Plan Irregularity, factor A: insignificant | 1

3.2. Vertical irregularity, Factor B: insignificant | 1

3.3. Short columns, Factor C: insignificant | 1

3.4. Pounding potential

Pounding effect D1, from Table to right: 1.0

Height Difference effect D2, from Table to right: 1.0

Therefore, Factor D: 1

3.5. Site Characteristics insignificant | 1

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

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

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

3.7. Overall Performance Achievement ratio (PAR) | **1.00** | **1.00**

4.3 PAR x (%NBS)b:

PAR x Baselline %NBS: | **86%** | **86%**

4.4 Percentage New Building Standard (%NBS), (before) | **86%**

GHD

Level 11, Guardian Trust House
15 Willeston street, Wellington 6011
T: 64 4 472 0799 F: 64 4 472 0833 E: wgtnmail@ghd.com

© GHD Limited 2013

This document is and shall remain the property of GHD Limited. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Draft	Simon Barker	Paul Clarke	Paul Clarke	Stephen Lee		20/05/2013