

Project: 7152

23 August 2012



Fletchers EQR – Structural Investigation

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Property Address: 34 Carters Road, Aranui
Claim Number: CLM/2011/042891
EQR Hub: Aranui
Inspector: Sam Richards and Niall Thomson
Test Date: 24 April 2012
Project Supervisor: Noel Ryan
Report Type: Foundation Assessment & Site Soils Investigation

1.0 SUMMARY

With the exception of the settlement of the north-west corner of the house, the structure has suffered minimal damage from the recent Canterbury earthquake sequence.

To remedy the settlement of the foundations, we recommend that the foundations be re-levelled.

Based on previous jobs undertaken for Fletchers EQR, we understand that foundation wall releveling requires a Building Consent.

2.0 RECOMMENDED STRUCTURAL REPAIR

To repair the house foundations, we recommend that the following works be undertaken (the following works are also described on the attached structural drawings). Note that this is only a partial scope of work and it is expected that the following scope will be included in the full scope of repair work:

	PRE-CONSTRUCTION
1	Prepare documentation and apply for a Building Consent for the foundation releveling.
	CONSTRUCTION
2	Install jacking pads and jack off the existing concrete foundation wall back to level.
3	Jack and pack internal piles.
4	There is a section of veneer on the eastern side of the main entry door that has suffered in-plane displacement of approximately 4-5mm. We recommend that this be replaced if it is practicable to obtain matching bricks, or the bricks be realigned and the mortar joint filled with epoxy injection resin and then repointed to match the existing.

5	Make good damage to walls, landscaping and external concrete patios from re-levelling works.
QUALITY CONTROL	
6	<p>We envisage that the following inspections will be required as part of the works:</p> <ul style="list-style-type: none"> • Inspection of ground bearing below jacking pads by structural engineer. • Inspection of insitu pile reinforcing before concrete pour by structural engineer. • Inspection of jacking and packing and connections by Christchurch City Council building inspector.
7	Contractor to provide a PS3 for the relevelling. The Contractor should also provide a plan showing the finished floor levels.

Note these are structural repairs and non structural repairs should be referred to the EQR scope of work.

3.0 ASSESSMENT SCOPE

Richards Consulting Engineers Limited has been requested by Noel Ryan on behalf of the Aranui EQR Hub to assess the house and garage structure on the property and advise on appropriate structural repairs. The work has been undertaken in accordance with our agreement with Fletchers Construction Company Limited.

The scope of the assessment included:

- A visual walk around and inspection of the interior and exterior of the building. The sub-floor was inspected from the sub-floor hatch. The inspection did not involve any invasive testing.
- We undertook a measurement of the floor heights using a zip level.
- Determine site sub-soil properties.
- Advising of appropriate foundation strengthening and repairs.
- The inspection was undertaken at a point in time (24 April 2012) and if subsequent moderate aftershocks are experienced then further damage may occur which will require a re-assessment.

4.0 STRUCTURAL DESCRIPTION

There is a single storey house located on the property and a double garage located on the south-west corner.

The primary structure of the house consists of timber framing founded on a concrete perimeter foundation wall and internal concrete piles. The house is clad in a light corrugated iron roof and a brick veneer. There is a chimney located on the western edge of the western wall of the house (refer Photo 1).

The double garage is constructed with concrete block walls and light timber framed roof founded on a concrete slab. It appears that a slab from an historic single garage has been used in the construction of the double garage with a cold form join in the slab along the interface.



Photo 1 – Southern elevation of house

5.0 GROUND AND STRUCTURAL DAMAGE

We understand there was no liquefaction on site. However, there was liquefaction on the street adjacent to the property. We did not observe any significant damage to the ground. It was noted that there was differential settlement between the path and the house foundations in the north-west corner.

34 Carters Road is classified by CERA as being in the Technical Category 2 Zone (TC2 – yellow). TC2 is defined as having minor to moderate land damage from liquefaction being possible in future significant earthquakes. CERA considers the Department of Building and Housing document “Revised guidance on the repair of residential houses following the Canterbury earthquake sequence – November 2011” to be suitable for foundation repairs and new foundations on this site.

We inspected the primary of the house and did not observe any significant damage from the recent earthquakes. The chimney is squat and protrudes from the roofline a small distance - 200-300mm - and no damage to the bricks was observed with the exception of the collapse of the fire bricks (non structural) in the hearth.

The zip level survey showed that the floors are generally level with a settlement towards the north-west corner. There is a floor height variation in the lounge and kitchen of 54mm and floor slopes of up to 0.95%. Due to the evidence of differential movement between the path and foundation wall on the northwest corner (the painted foundation wall is below the level of the adjacent path) and the fact that the north gutter now slopes the wrong way, it is clear that the settlement of the house is due to the recent earthquake effects.

The Department of Building & Housing guideline document recommends that Type B foundations (concrete perimeter wall and internal piles) be releveled when the floor height variation exceeds

50mm or the floor slope exceeds 0.5%. Therefore, based on the DBH guidance and the settlement observed, we recommend that the west portion of the house be releveled (refer attached structural drawing S.01). We understand from contractors that it is pragmatic to lift a foundation wall with a brick veneer in place. We have therefore proposed a jacking methodology and underpinning piles on the attached structural drawing.

There are a number of areas in the brick veneer where there is evidence of stepped cracking due to settlement. In one area between the bedrooms on the southern wall, the upper section of brick panelling has displaced in plane approximately 4-5mm to the east. While we consider the wall to be stable, the mortar joint has been compromised. If it is possible to realign the bricks, we recommend injecting epoxy resin in between the horizontal cracked brick interface. This interface would then be repointed to match the existing. However, if it is not considered practicable by the contractor, we recommend that the upper 1.2m of the brick be removed and replaced with matching bricks.

The garage slab shows a differential settlement between the historical slab and new slab, estimated to be approximately 4-5mm vertical step which also shows in the garage door. We do not consider this affects the structural performance of the garage and recommend a cosmetic repair such as grinding and localised FLC in this area. At the time of the inspection there was a significant amount of storage items in the garage and we were unable to inspect the floor or assess the levels apart from along the door threshold.

6.0 BUILDING CONSENT REQUIREMENTS

We understand from previous job working for Fletchers Construction Company EQR that where a foundation wall is to be jacked and underpinned, that this work should be included in a Building Consent application.

7.0 SOILS SUMMARY

The site is mapped as Aranui aged, Christchurch formation dominantly sand of fixed and semi-fixed dunes and beaches.

Aerial imagery from 26 February 2011 shows evidence of liquefaction on the street adjacent to the property.

The investigations consisted of a visual walkover inspection of the site, four scala penetrometer probes and an auger test hole. The approximate test locations are shown on the attached site plan.

The Scala tests show that 200kPa geotechnical ultimate bearing capacity is not encountered until a depth of 1.0m below ground level.

The hand auger test showed that the subsoils consist predominantly of loose sand becoming medium dense at 1.4m depth. The water table was encountered at 1.6m depth. The test was terminated at 2.4 metres depth due to it not being possible to extract a sample due to the saturated material.

While it is desirable to extend the testing down to 4.0 metres depth, due to the minimal foundation work proposed we consider it pragmatic to rely on these results for the foundation design.

In summary we recommend any new foundations be founded at a minimum of 1.0m depth on 200kPa bearing.

8.0 DISCLAIMER

The recommendations in this report are based on our visual site walkover and the scala penetrometer investigations. Assumptions have been made about the continuity of subsoil properties between the test holes; due to the inherent variability of sub-soils this assumption cannot be guaranteed.

The report has been prepared for The Fletcher Construction Company Limited as agents for EQR. It is expected that the Christchurch City Council will also rely on this report. Other parties rely on this report at their own risk.

If there are any questions on this assessment please contact the writer.

Prepared by



Sam Richards
CPEng (Civil & Structural)

Attachment: Test location plan
Soil results
Structural Drawing S.01
Producer Statement (PS1-design)
Project memorandum certificate



GARAGE

T₁

T₂

4m

4m

0.5m

34 CARTERS RD

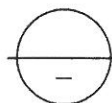
2m

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2m

T₃

CARTERS ROAD




Test Location - Plan

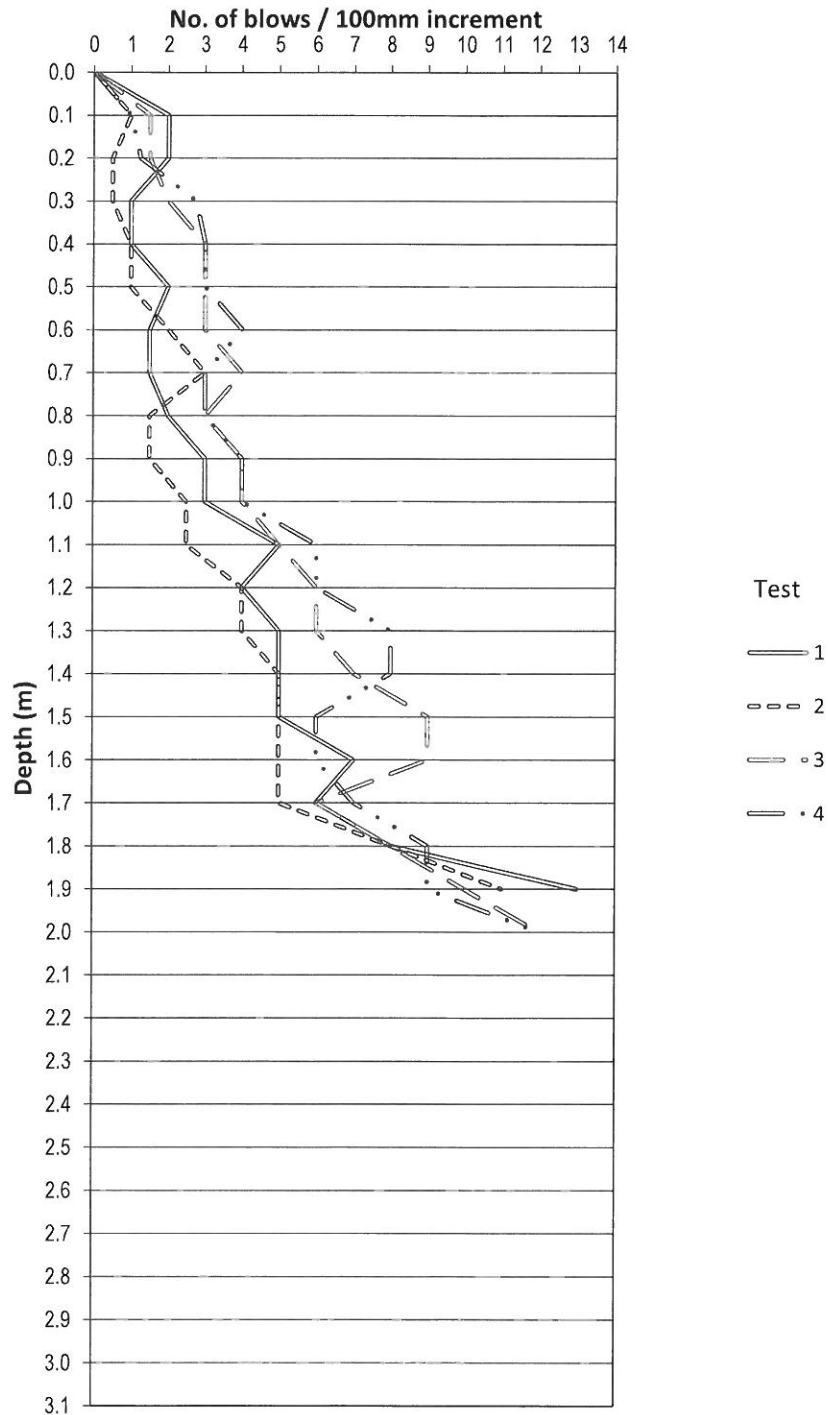
Note to Scale or Proportion

Notes:


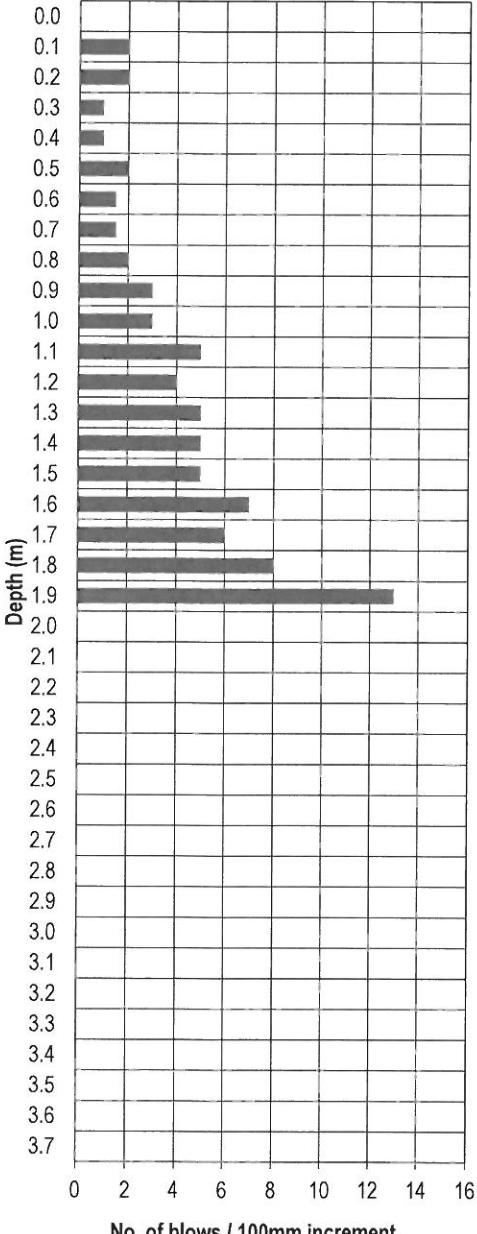
1. This plan has been produced to for the purpose of providing a reference. This is a sketch plan and is not to scale and only to approximate proportions.
2. The test locations are approximate only.

SITE SOILS INVESTIGATION		
Project No.:	7152	
Project:	Fletchers EQC	
Address:	34 Carters Road	
Date tested:	13 April 2012	

Combined Site Soil Penetrometer Test results


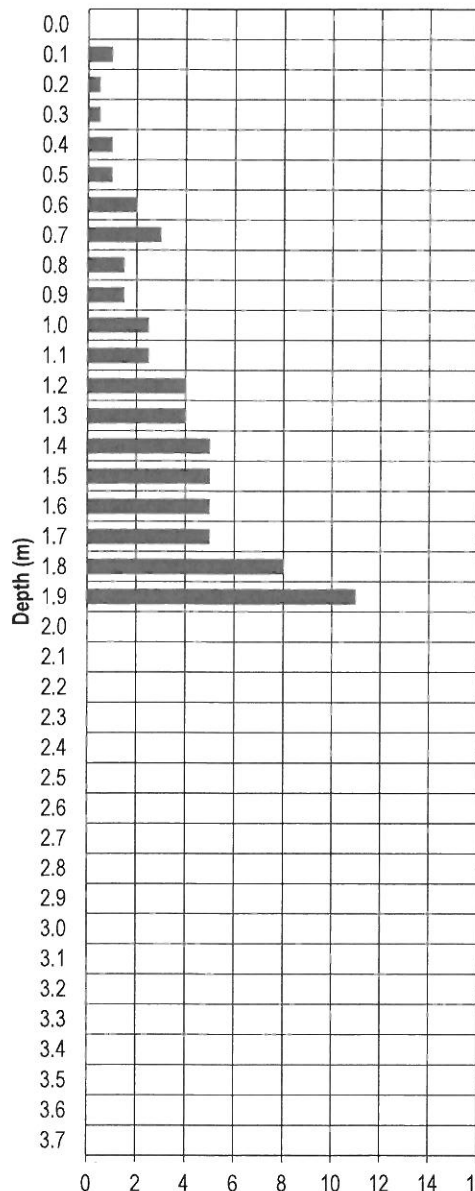



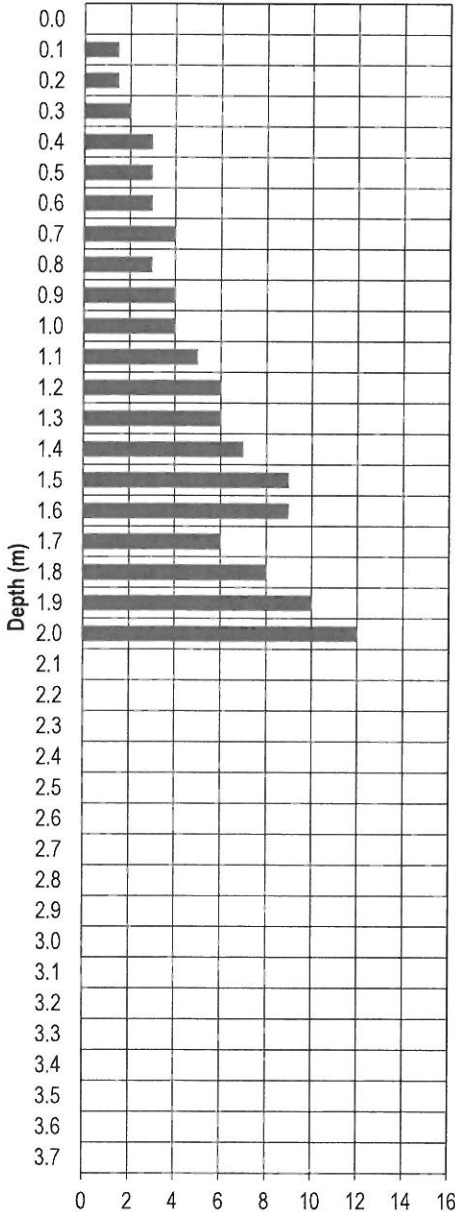
Test method used: NZS 4402:1988 Test 6.5.2

SITE SOILS INVESTIGATION			
Project No.: 7152			
Project: Fletchers EQC			
Address: 34 Carters Road			
Date tested: 13 April 2012		Test ID: 1	
Notes:			
Depth below ground level	blows/100m	Scala Penetrometer Results	Soil Description
0.0	0		
0.1	2		
0.2	2		
0.3	1		
0.4	1		
0.5	2		
0.6	1.5		
0.7	1.5		
0.8	2		
0.9	3		
1.0	3		
1.1	5		
1.2	4		
1.3	5		
1.4	5		
1.5	5		
1.6	7		
1.7	6		
1.8	8		
1.9	13		
2.0			
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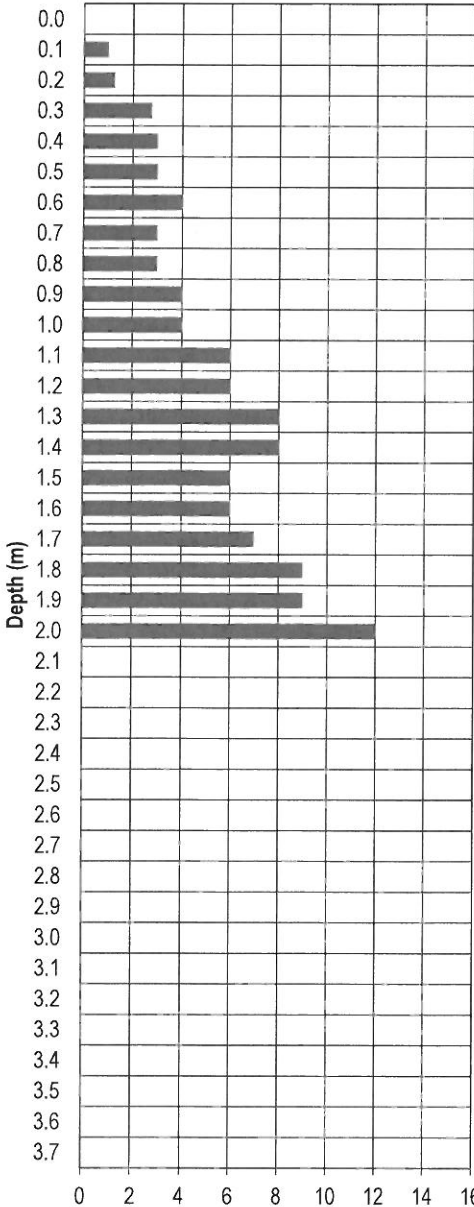
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SITE SOILS INVESTIGATION			
Project No.:	7152		
Project:	Fletchers EQC		
Address:	34 Carters Road		
Date tested:	13 April 2012	Test ID:	2
Notes:			
Depth below ground level	blows/100m m	Scala Penetrometer Results	Soil Description
0.0	0		(200mm) Brown, CLAY, Homogeneous very Loose, Moist
0.1	1		
0.2	0.5		
0.3	0.5		
0.4	1		
0.5	1		
0.6	2		
0.7	3		
0.8	1.5		
0.9	1.5		
1.0	2.5		
1.1	2.5		
1.2	4		
1.3	4		
1.4	5		
1.5	5		
1.6	5		
1.7	5		
1.8	8		
1.9	11		
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2.7			
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Test method used: NZS 4402:1988 Test 6.5.2			

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0.0	0	 <p>The graph displays the number of blows per 100mm increment for each depth from 0.0 to 3.7 meters. The x-axis represents the number of blows (0 to 16), and the y-axis represents the depth in meters. The data points are as follows:</p> <table><thead><tr><th>Depth (m)</th><th>No. of blows / 100mm increment</th></tr></thead><tbody><tr><td>0.0</td><td>0</td></tr><tr><td>0.1</td><td>1.5</td></tr><tr><td>0.2</td><td>1.5</td></tr><tr><td>0.3</td><td>2</td></tr><tr><td>0.4</td><td>3</td></tr><tr><td>0.5</td><td>3</td></tr><tr><td>0.6</td><td>3</td></tr><tr><td>0.7</td><td>4</td></tr><tr><td>0.8</td><td>3</td></tr><tr><td>0.9</td><td>4</td></tr><tr><td>1.0</td><td>4</td></tr><tr><td>1.1</td><td>5</td></tr><tr><td>1.2</td><td>6</td></tr><tr><td>1.3</td><td>6</td></tr><tr><td>1.4</td><td>7</td></tr><tr><td>1.5</td><td>9</td></tr><tr><td>1.6</td><td>9</td></tr><tr><td>1.7</td><td>6</td></tr><tr><td>1.8</td><td>8</td></tr><tr><td>1.9</td><td>10</td></tr><tr><td>2.0</td><td>12</td></tr><tr><td>2.1</td><td>12</td></tr><tr><td>2.2</td><td>12</td></tr><tr><td>2.3</td><td>12</td></tr><tr><td>2.4</td><td>12</td></tr><tr><td>2.5</td><td>12</td></tr><tr><td>2.6</td><td>12</td></tr><tr><td>2.7</td><td>12</td></tr><tr><td>2.8</td><td>12</td></tr><tr><td>2.9</td><td>12</td></tr><tr><td>3.0</td><td>12</td></tr><tr><td>3.1</td><td>12</td></tr><tr><td>3.2</td><td>12</td></tr><tr><td>3.3</td><td>12</td></tr><tr><td>3.4</td><td>12</td></tr><tr><td>3.5</td><td>12</td></tr><tr><td>3.6</td><td>12</td></tr><tr><td>3.7</td><td>12</td></tr></tbody></table>	Depth (m)	No. of blows / 100mm increment	0.0	0	0.1	1.5	0.2	1.5	0.3	2	0.4	3	0.5	3	0.6	3	0.7	4	0.8	3	0.9	4	1.0	4	1.1	5	1.2	6	1.3	6	1.4	7	1.5	9	1.6	9	1.7	6	1.8	8	1.9	10	2.0	12	2.1	12	2.2	12	2.3	12	2.4	12	2.5	12	2.6	12	2.7	12	2.8	12	2.9	12	3.0	12	3.1	12	3.2	12	3.3	12	3.4	12	3.5	12	3.6	12	3.7	12	
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Test method used: NZS 4402:1988 Test 6.5.2

PRODUCER STATEMENT – PS1 – DESIGN

(Guidance notes on the use of this form are printed on the reverse side)*

ISSUED BY: Richards Consulting Engineers Limited
(Design Firm)

TO: The Fletcher Construction Company - EQR
(Owner/Developer)

TO BE SUPPLIED TO: Christchurch City Council
(Building Consent Authority)

IN RESPECT OF: Foundation Repair
(Description of Building Work) -Refer attached structural report for detailed scope.

AT: 34 Carters Road
(Address)

LOT DP SO B1

We have been engaged by the owner/developer referred to above to provide
 Refer attached structural report/assessment services in respect of the requirements of
 Clause(s) B1 (Extent of Engagement) of the Building Code for
☐ All or ☒ Part only (as specified in the attachment to this statement), of the proposed building work.

The design carried out by us has been prepared in accordance with:
☒ Compliance Documents issued by Department of Building & Housing B1/VM1 & B1/VM4
(verification method / acceptable solution)

☐ Alternative solution as per the attached schedule

The proposed building work covered by this producer statement is described on the drawings titled
 Refer attached structural report/assessment and numbered Refer attached structural report/assessment;
 together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:

- (i) Site verification of the following design assumptions Refer attached structural report/assessment
- (ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code.

I, Sam Richards am: ☒ CPEng 228315 #
(Name of Design Professional)

☐ Reg Arch #

I am a Member of: ☒ IPENZ ☐ NZIA and hold the following qualifications: Be(hons)

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000*.
 The Design Firm is a member of ACENZ ☐ YES ☒ NO

SIGNED BY Sam Richards ON BEHALF OF Richards Consulting Engineers Limited
(Design Firm)

Date (signature) 

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000.*

This form is to accompany **Form 2 of the Building (Forms) Regulations 2004** for the application of a Building Consent.

GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1992. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suite of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

PS1 Design	Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;
PS2 Design Review	Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;
PS3 Construction	Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2003 ¹ or Schedules E1/E2 of NZIA's SCC 2007 ²
PS4 Construction Review	Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate.

This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence-based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ) or the New Zealand Institute of Architects (NZIA), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ), this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

* Professional Indemnity Insurance

As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5)³ (OL1-OL4)². The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design Firm's engagement.

Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

Refer Also:

- ¹ *Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2003*
- ² *NZIA Standard Conditions of Contract SCC 2007 (1st edition)*
- ³ *Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2004)*

www.acenz.org.nz
www.ipenz.org.nz
www.nzia.co.nz



Restricted Building Work Notice



Date 9-01-13
Address 34 CARTERS ROAD ARANUI
Hub TECH 22

Claim Number 2011/042891
Engineer/QS TIM DAY

SCHEDULE OF INSPECTIONS;

Purpose:

The attached scope of work includes elements of restricted building work. This work is subject to standard quality assurance processes including inspection and approval by EQR Engineers.

Elements of restricted building work;

- New section of concrete perimeter foundation
- ~~New area of concrete slab~~
- New connections between floor and foundation structure

Required Engineers Inspections;

- Excavations of foundations
- Reinforcing prior to casting slab and footings
- Final inspection to confirm required levels improvement has been achieved

Upon inspection and acceptance of the RBW the engineer will issue a site instruction that all elements of the work are in order and give approval for work to continue. A PS4 certificate will be issued against claim upon satisfactory completion of the works.

Contact:

Please contact Fletchers EQR Technical Hub on **03 741 8545** to arrange for an inspection by an engineer. 48 hours notice is required for all inspections.

Issued By 

Tim Day
Senior Structural Engineer

Design underpinning pool

$G \Rightarrow$ 1.6m max spans

foundation wall	$= 0.5 \times 0.25 \times 24 \times 1.6m = 4.8$
Timber wall	$= 2.4m \times 0.3kPa \times 1.6m = 1.2$
water	$= 2.7m \times 0.07 \times 17 \times 1.6m = 5.1$
roof	$= 3.0m \times 0.3kPa \times 1.6m = 1.4$
floor	$= 1.2m \times 0.4kPa \times 1.6m = 0.8$
	<u>13.3kN</u>

$Q \Rightarrow$ Floor $= 1.2m \times 1.5kPa \times 1.6m = 2.9$

$1.2G + 1.5Q = 28.3kN$

Check bearing on 450x450 pile

$q^* = \frac{28.3}{0.45 \times 0.45} = 139kPa$

$\phi Q = 0.8 \times 200kPa = 120kPa < 139kPa$

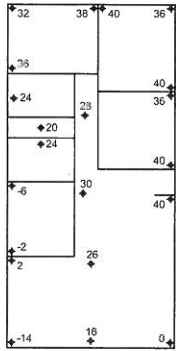
Try 500x500 pile

$q^* = 113kPa \leq 120kPa$ 0.11

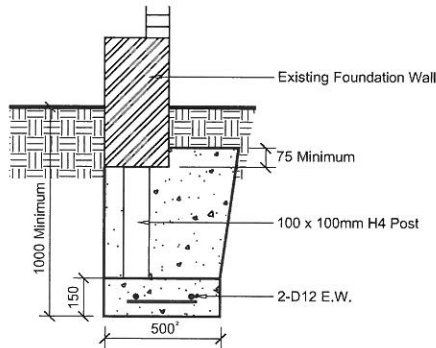
Use 500x500 pile to support foundation wall

NOTES:

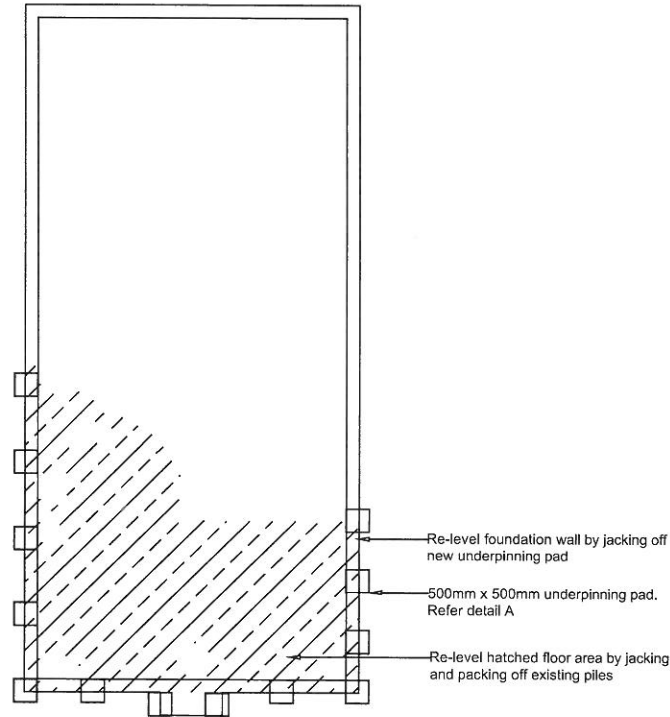
1. FLOOR LEVELS MEASURED WITH ZIP LEVEL ON 24/04/12



FLOOR LEVEL SURVEY & DAMAGE AREAS
SCALE 1:200



Section - Underpin Pile
SCALE 1:20



FOUNDATION REPAIRS PLAN
SCALE 1:100

NOTES:

1. Engineer to verify 200kPa ground bearing.
2. Foundation to be re-leveled by:
 - Jacking foundation wall to be level by concurrently raising jacks.
 - Prop foundation off pad with post and wedge tight.
 - Removes jacks and excavation with concrete.
3. Lift jacks in 3mm increments.
4. Use 20mPa concrete.

SCOPE OF WORKS

The scope of works for the foundation repairs includes:

- Re-level the internal floor area and perimeter foundation wall in areas shown on plan.
- Make good damage caused by re-levelling works.

SPECIFICATION NOTES:

1. The Contractor is expected to inspect the subfloor and foundations before submitting tender to confirm access and methodology.
2. The Contractor shall have a documented health and safety procedure for the proposed lifting methodology.
3. If at any time prior to Practical Completion, the Contractor should become aware of any signs of distress, excessive settlement or deflection, conflict of components or any other indications whatsoever of actual or potential damage to the Contract Works or any part thereof, he shall forthwith notify the Engineer, and confirm such notice in writing as soon as is practicable.
4. The Contractor shall re-level the floor by both jacking the perimeter foundation wall and jacking onto of the existing piles. All lifting shall be undertaken concurrently using a series of jacks to achieve a planar floor.
5. The piles shall then be packed with timber.
6. Levels shall be measured with a laser level to ensure finished levels meet the following tolerances before reattaching bearers to piles:
 - a. Slopes in the floor between two points greater than 2m apart shall not exceed 0.5%.
 - b. The total floor height variation shall be less than 30mm.
9. The packing up of the timber floor shall be undertaken as follows:
 - a. Packers to consist of un-cracked 100mm (minimum) H5 treated timber packers.
 - b. No more than three packers to be used per pile.
 - c. Place Damp proof course between concrete and packers and secure packers with skew nails (pre-drilled if required)
 - d. Re-use existing fixings to attach piles and foundations to bearers and plates.
 - e. New fixings shall be installed where this is not possible. New fixings shall consist of proprietary nail plates with epoxied in M10 anchors or 4mm wire stapled to timber bearers and plates.
10. Contractor shall make good any cracked floor tiles, linings, windows, flooring and trim as the result of the re-levelling including easing of doors, draws and cupboards.
11. Contractor to provide PS3 for the re-levelling and epoxy application. The PS3 should include a plan showing the final levels.

DRAWING IS TO BE READ IN CONJUNCTION WITH ARCHITECT'S DRAWINGS

CHARDS
JLTING ENGINEERS

RD 2
Darfield
Phone 03 4201906
Mobile 021 777993
Email: rce@rcengineers.co.nz

PROJECT TITLE
**34 CARTERS ROAD, ARANUNI
CHRISTCHURCH**

DRAWING TITLE
EARTHQUAKE FOUNDATION REPAIRS

REV NO.	REVISION	DATE	APPROVED	PROJECT NO.	7152	DESIGNED	SR
1.	FOR CONSTRUCTION	July 2012	SR	SCALE @ A3 As Shown		DRAWN	NT
				REV NO.	1	SHEET NO.	S.01

SEDIMENT CONTROL

Sediment control to be controlled where foundations or roofing drainage are to be removed.

All sediment control to be compliant to NZBC-E1.

Straw-bales to be laid to all boundaries where run off may occur. Straw-bales to be placed in 200mm deep trench, tied together and anchored to ground with stakes.

A stabilised pad of aggregate on a woven geotextile base located at any point where traffic will be entering or leaving a construction site.

Clear the entrance and exit area of all vegetation, roots and other unsuitable material and properly grade it.

Lay woven geotextile; pin down edges and overlap joins;

Provide drainage to carry runoff from the Stabilised Construction Entrance to a sediment control measure;

Place aggregate to the specifications below and smooth it.

Surface Water Drainage work where any drainage pipes exist to be temporary disconnected and reconnected as soon as practical.

Contractor to oversee all sediment control.

Surplus Gravel to be contained behind sediment fences.