

RELEVELING REPAIR PLAN: 25 FLEMINGTON AVENUE, NORTH NEW BRIGHTON, CHRISTCHURCH.  
CLIENT: HELIO JACUNDINO C/- VIKING BUILDERS

LEGEND

- Under-pinning the perimeter foundation. 550mm X550mm by 400mm depth concrete pads at max. 2000 mm c/c
- Internal timber floor with timber piles along the perimeter re-leveled by jacking and packing as per engineering details on sheet s2. Actual extent to be confirmed during construction.
- ±XX

Foundation/Timber Floor to be lifted by xx mm

- AREA TO BE RELEVELLED USING "SIKA FLOOR LEVELLING COMPOUND" AS PER MANUFACTURE'S SPECIFICATION. ALTERNATIVE PRODUCT SHOULD BE APPROVED BY ENGINEER PRIOR TO APPLICATION (INDICATIVE ONLY).
- Attic floor local slopes to be remediated by trimming and strengthening or packing floor joists or installing new floor joists alongside the existing floor joists at the target height.

Note: The areas and amounts are indicative only. Builder to ensure the building is re-leveled to within target tolerances.

GENERAL NOTES

1. Contractor shall verify all dimensions on site.
2. All dimensions are in millimeters unless noted otherwise.
2. 3.These drawings shall be read in conjunction with Cephas Rock Structural Assessment Report - ref: 25-122 VO1; any discrepancy shall be referred to the engineer before proceeding with the work.

INSPECTION SCHEDULE:

1. Jacking pads inspection before pouring concrete (Design bearing capacity: 200kPa UBC).
2. Subfloor connections.
3. Final floor level survey, epoxy crack repairs, and any other structural repair items.

Minimum 24 hours notice is required for all inspections.

RE-LEVELLING NOTES

Current overall difference: 120mm for the main dwelling  
40mm for the garage and entry area  
42mm for the attic area

Target tolerance: re-level to within 25mm overall, and remediate all local slopes exceeding 1:200

Contractor to confirm levels before re-levelling.

1. Locate and ensure services can accommodate lift heights, or detach these before the lift begins.
2. Excavate jacking pads at locations shown. Excavate and expose the top of the footing ribs/outstands along entire perimeter (refer to section).
3. Install portable jacks into position.
4. Concurrently lift perimeter foundation wall in maximum 3mm increments. First, create a uniform sloping planar floor plate. Ensure planar floor plate is maintained during lift to final horizontal level.
5. Place 90x90 H5 timber struts between jacking pads and foundation wall and remove jacks (jacks may be kept and cast in instead of timber struts if preferred).
6. Fill between jacking pads and foundation wall with concrete. Fill under all other areas of the foundation wall with flowable grout to restore bearing between foundation wall and the ground.
7. Concurrently jack and pack internal piles as per MBIE guidelines.
8. Place 90x90 H5 timber struts between jacking pads and foundation wall and remove jacks (jacks may be kept and cast in instead of timber struts if preferred).
9. Repair perimeter foundation cracks using approved epoxy injection following re-leveling.
10. Repair remaining items as per original engineering report.

Christchurch City Council

Page 1 of 37

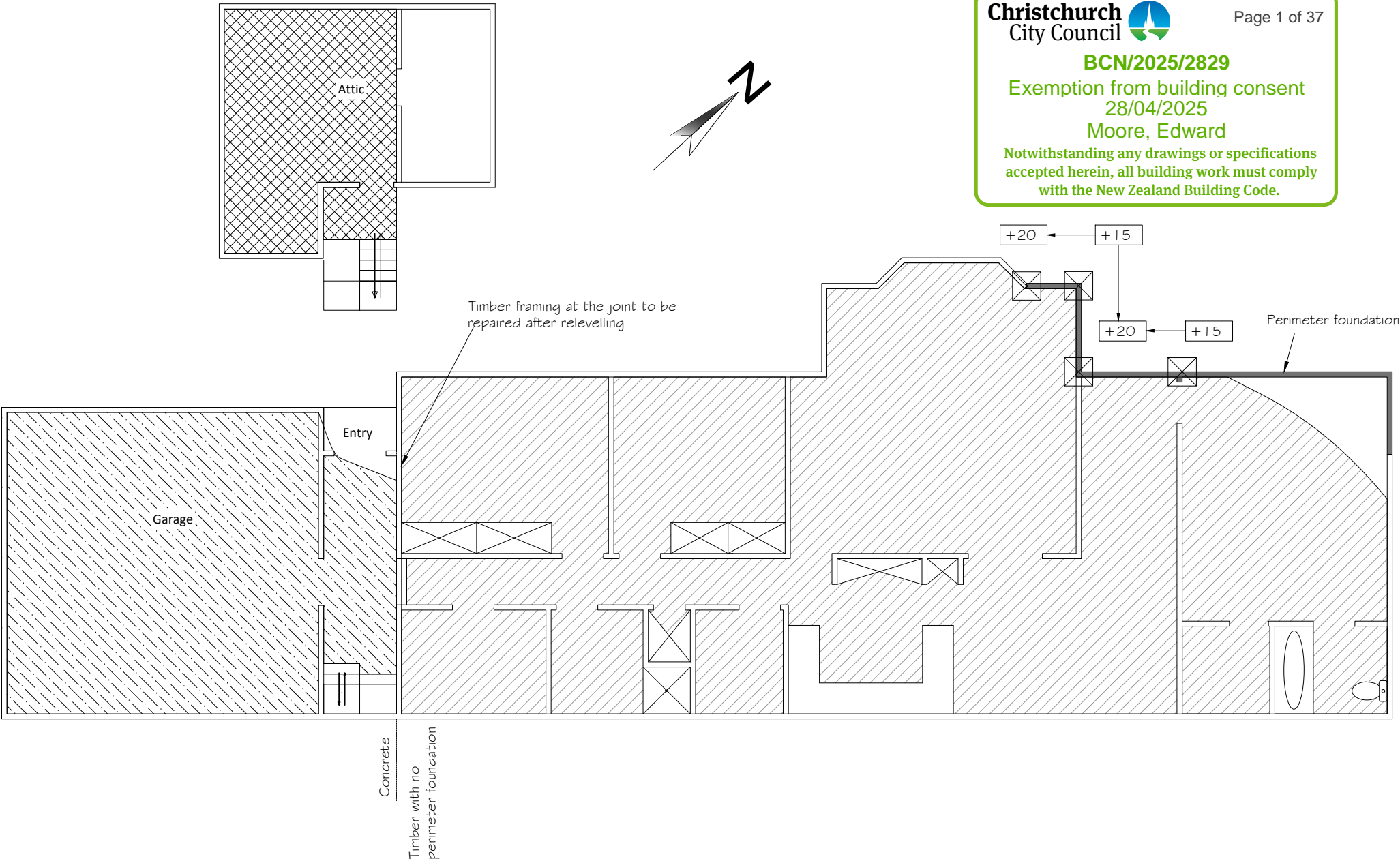
BCN/2025/2829

Exemption from building consent

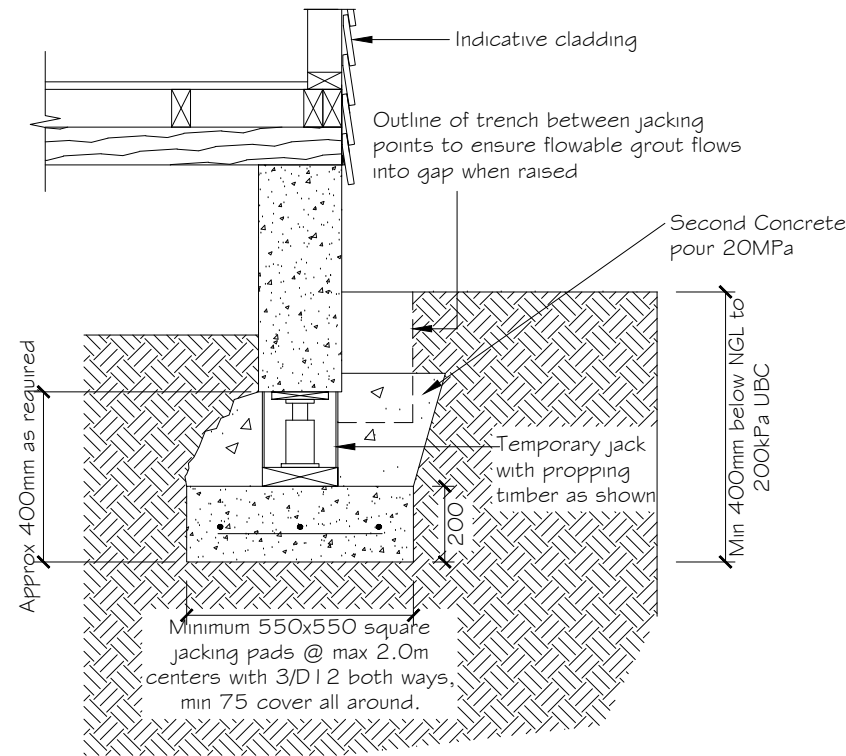
28/04/2025

Moore, Edward

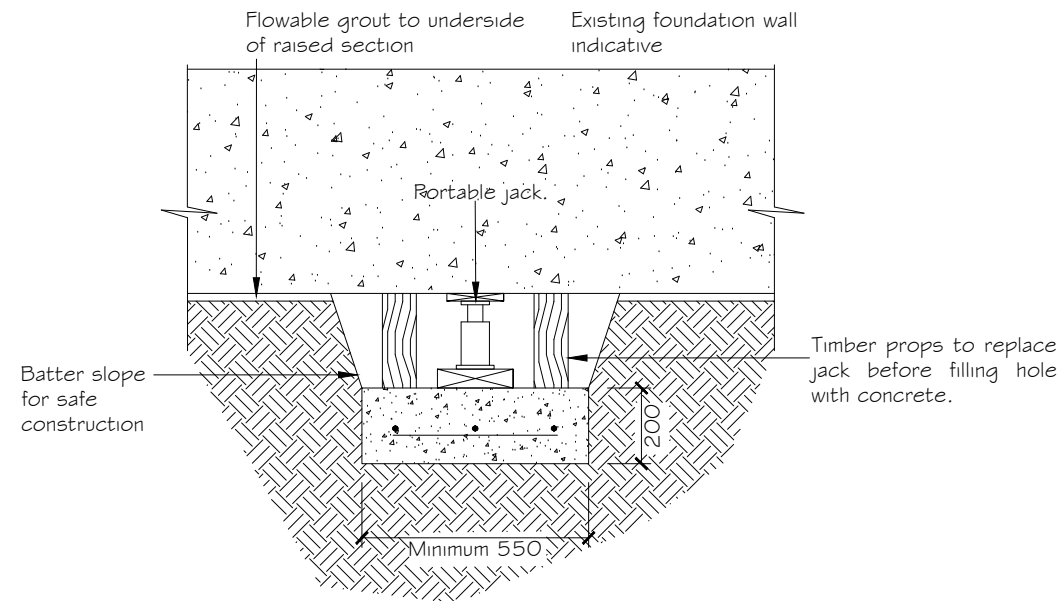
Notwithstanding any drawings or specifications accepted herein, all building work must comply with the New Zealand Building Code.



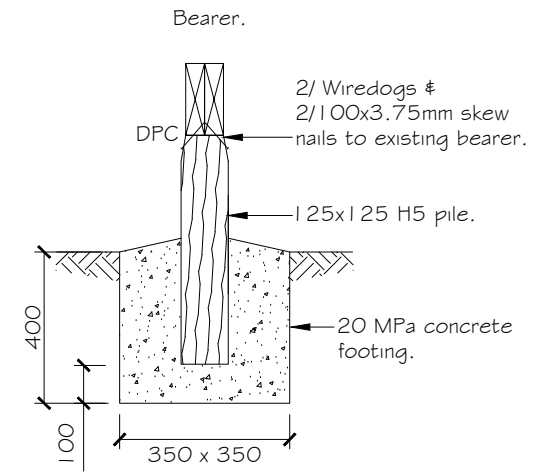
			<div><div></div><div>Cephas Rock Limited Structural Engineers</div><div>PO Box 37174 Christchurch 8425P: (03) 338 5387E: admin@cephasrock.co.nzF: (03) 338 5389www.cephasrock.co.nz</div></div>	Title: Note & Repair Plan		Job no.: 25-122	Sheet: 51 of 6
				Address: 25 Flemington Avenue, North New Brighton, Christchurch	Client: Helio Jacundino c/- Viking Builders	Design: M.L.	
						Drawn: M.L.	Original size: A3
						Approved: J.W.	
O		07-04-2025					
Rev.	Remark/Comment	Date					



Jack Detail Under Perimeter Beam - Section View  
N.T.S

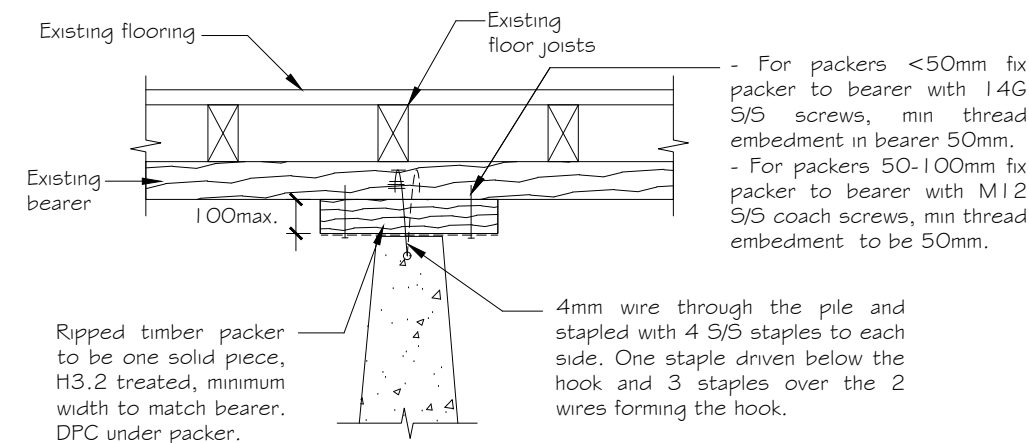


Jack Detail Under Perimeter Beam - Elevation View  
N.T.S



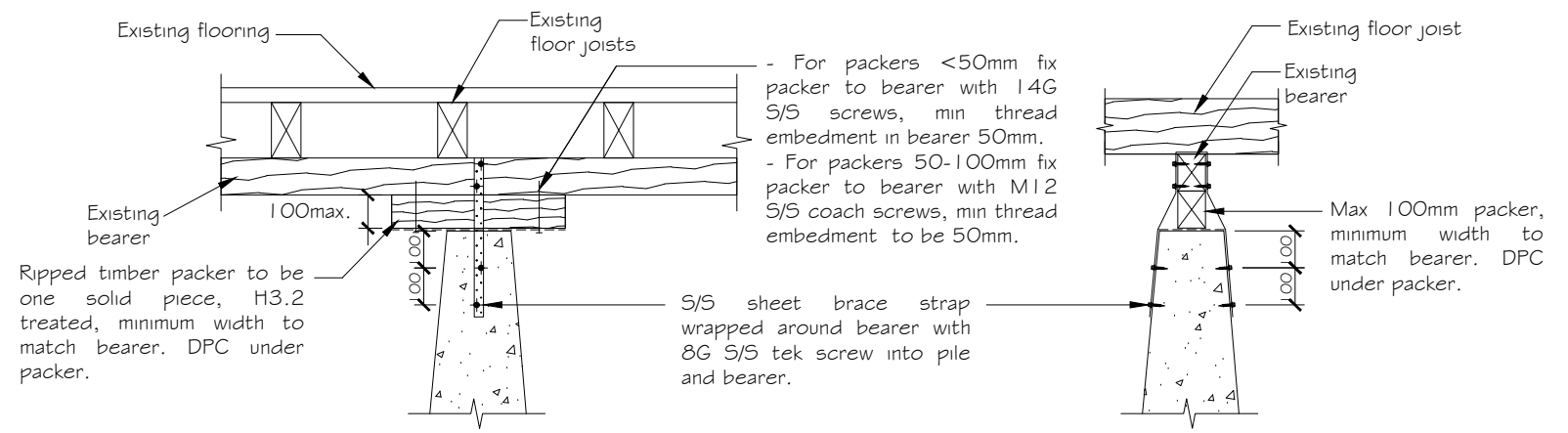
Internal Pile Replacement Detail (If Required)  
N.T.S

Note:  
If pile is at a bearer joint, connections are required to each bearer.




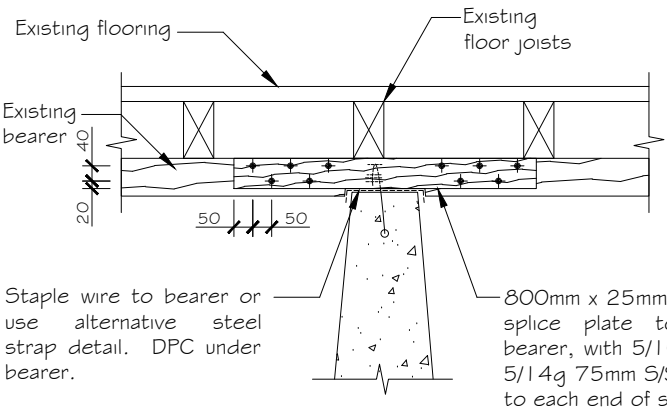
Typical Pile Packing Up To 100mm.  
N.T.S

Note:  
If pile is at a bearer joint, connections are required to each bearer.



Alternate packing connection detail  
N.T.S

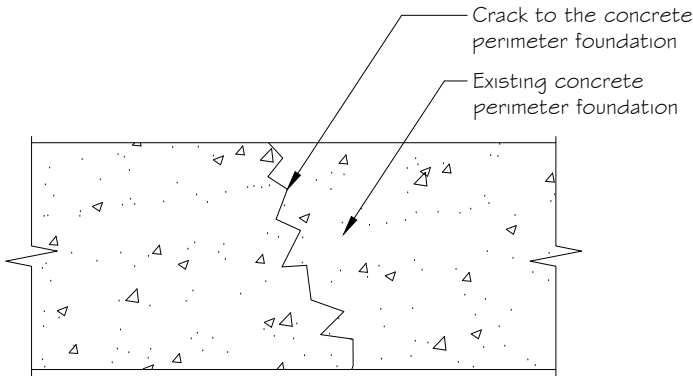
			 <div>Cephas Rock Limited Structural Engineers</div> <div>PO Box 37174 Christchurch 8425</div> <div>P: (03) 338 5387 E: admin@cephasrock.co.nz</div> <div>F: (03) 338 5389 www.cephasrock.co.nz</div>	Title: Note & Repair Plan		Job no.: 25-122	Sheet: 52 of 6
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O		07-04-2025					
Rev.	Remark/Comment	Date					



- Notes:
- It is important for the splice plates to bear on top of the pile for the splice to be effective.
  - The ends of 100mm and 125mm deep bearers may be notched by 20mm with a square cut transition. If the transition is sloped at 2 to 1 then the notch depth may be increased to 35mm.
  - Where bearers span over intermediate supports, they may be notched on the underside face of the bearer by 20mm over a maximum length equivalent to the pile width plus 50mm.
  - Where hardwood prevents nail driving, 0.8mm pilot holes may be drilled.

Bearer Notching Detail

N.T.S



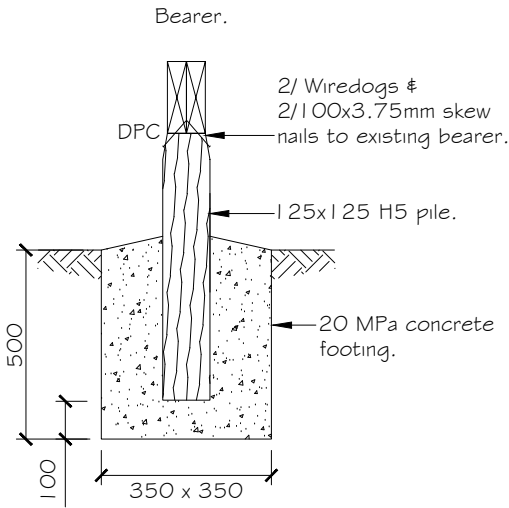
Crack in Concrete Perimeter Foundation (Indicative)

N.T.S

Crack Width	Repair method	Product specifications
Hairline to 0.2mm	No repairs required	
0.2mm - 10mm	Low viscosity epoxy injection	Sikadur 52 or equivalent approved
10mm - 20mm	Cementitious grout injection	Sikadur 31/ Ramset Pozilite HB/ Pozicote FR or equivalent approved
>20mm OR with >3mm out of plane movement	Breakout and recast with new enhanced perimeter foundation	


NOTE

1. Prepare all concrete crack's surfaces clean and free from loosely adhering particles, or contaminants such as dirt, oil, dust, grease etc.
2. Application of product to interface shall be in accordance with manufacturer's instructions.
3. Crack injection work should be left for 5-7 days to fully cure before full structural integrity is achieved.
4. Contractor to confirm crack repair has been completed in acceptable standard.



External Pile Replacement Detail (If Required)

N.T.S

			<div><div>Cephas Rock Limited Structural Engineers</div></div> <div>PO Box 37174 Christchurch 8425</div> <div>P: (03) 338 5387 E: admin@cephasrock.co.nz</div> <div>F: (03) 338 5389 www.cephasrock.co.nz</div>	Title: Note & Repair Plan		Job no.: 25-122	Sheet: 53 of 6
				Address: 25 Flemington Avenue, North New Brighton, Christchurch	Client: Helio Jacundino c/- Viking Builders		
O		07-04-2025				Drawn: M.L.	Original size: A3
Rev.	Remark/Comment	Date				Approved: J.W.	

GENERAL NOTES

- 1) These drawings shall be read in conjunction with all architectural drawings, and other consultants drawings and specifications. Any discrepancy shall be referred to the engineer before proceeding with the work.
- 2) Contractor shall verify all dimensions required for set-out and construction. Do not scale from these drawings.
- 3) All materials and workmanship shall comply with the current relevant NZS standards and Building Code.
- 4) All dimensions are in millimetres unless noted otherwise.
- 5) All proprietary products shall be installed in accordance with the manufacturer's specifications and instructions.

TIMBER

- 1) All timber shall be stress grade SG8 U.N.O.
- 2) Provide washers between all bolts and timber.
- 3) A damp proof course shall be placed between all timber in contact with concrete/masonry.
- 4) All fixing to comply with NZS3604:2011 U.N.O

STRUCTURAL STEEL

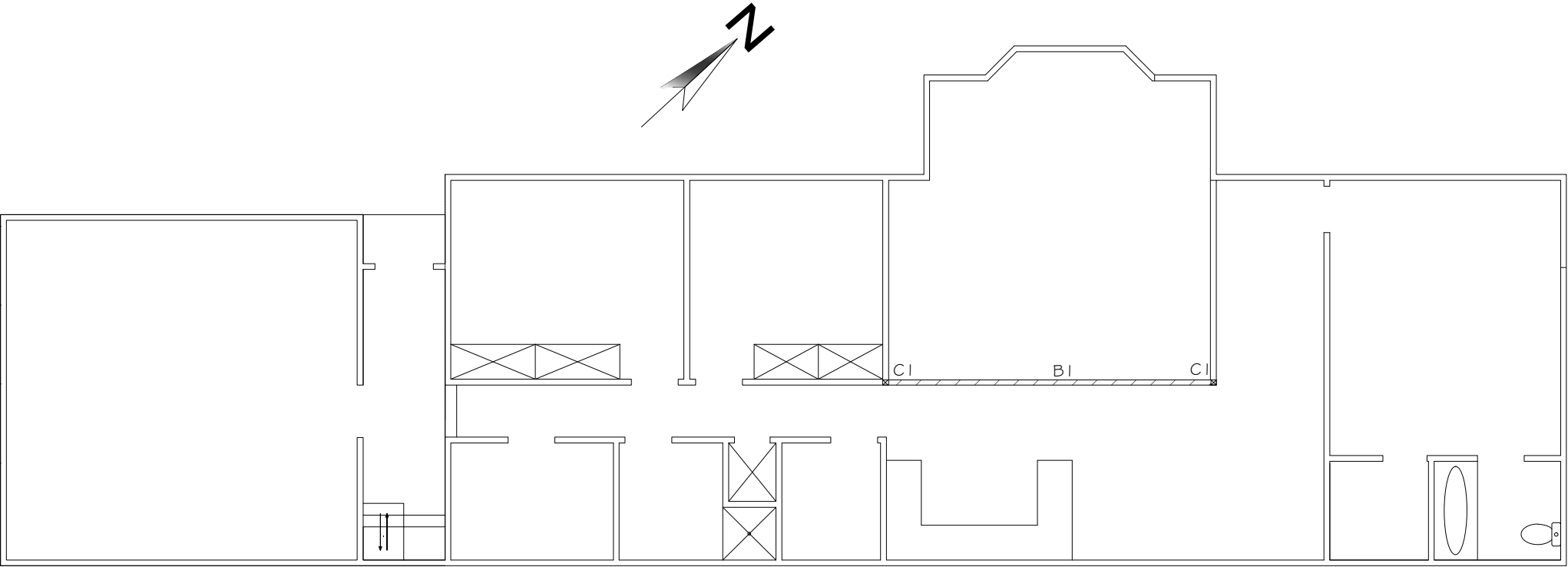
- 1) All structural steel shall be
- Grade 250+ for plates/cleats and stiffeners U.N.O  
Grade 300+ for PFC  
Grade 350+ for SHS
- 2) All welds shall be Category S.P. E41XX/W40X U.N.O.
- 3) All interior steelwork shall be primed after fabrication.
- 4) All external steelwork shall be galvanised in accordance with AS/NZS2312 after fabrication.
- 5) Drypack and grout placed between baseplates/endplates and concrete / masonry shall be 60 MPa shrinkage compensated proprietary products supplied for intended application.
- 6) All bolts shall be structural grade 8.8/5 U.N.O.

CONCRETE

- 1) Materials and workmanship to comply with NZS 3109.
- 2) All concrete shall be minimum 25 MPa concrete.
- 3) Minimum concrete cover to reinforcement (finishes not included):  
To dry interior with DPM: 30mm  
To exterior with DPM: 40mm  
To exterior against earth: 75mm

INSPECTIONS


- 1) Subsoil conditions and bearing capacity (Geotechnical Ultimate: 276kPa) to be verified after pile footing pits are excavated.
- 2) All structural work must be inspected and approved by the engineer prior to thier concealment.
- 3) Minimum 24 hours notice is required for all inspections.
- All structural items prior to their concealment.



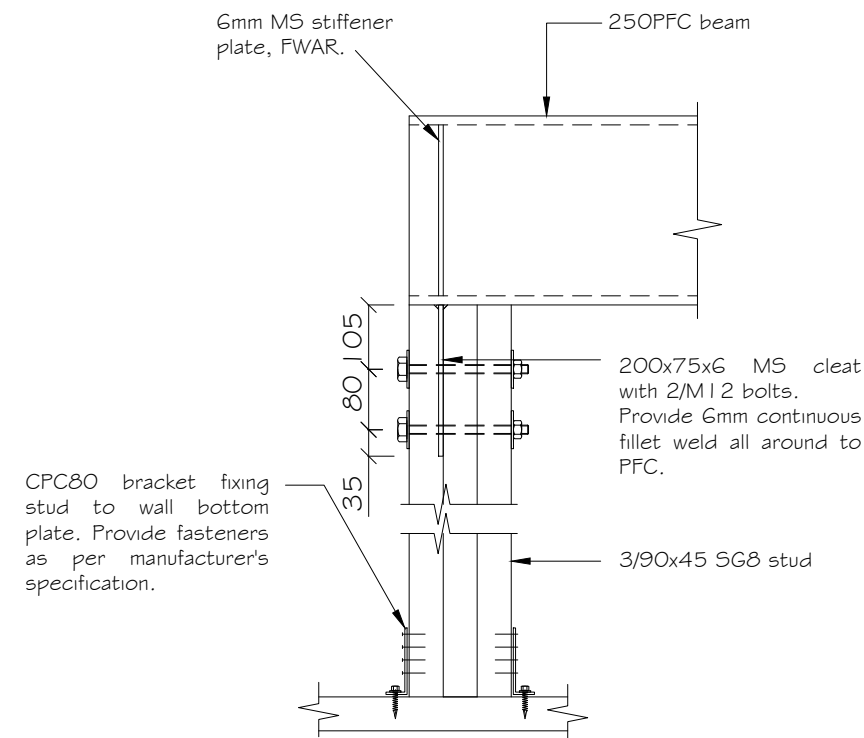
BEAM/COLUMN LAYOUT PLAN  
N.T.S

MEMBER SCHEDULE		
Label	Size	Max span/ height (m)
BI	250PFC	5.6m
CI	3/90x45 mm SG8	2.47m

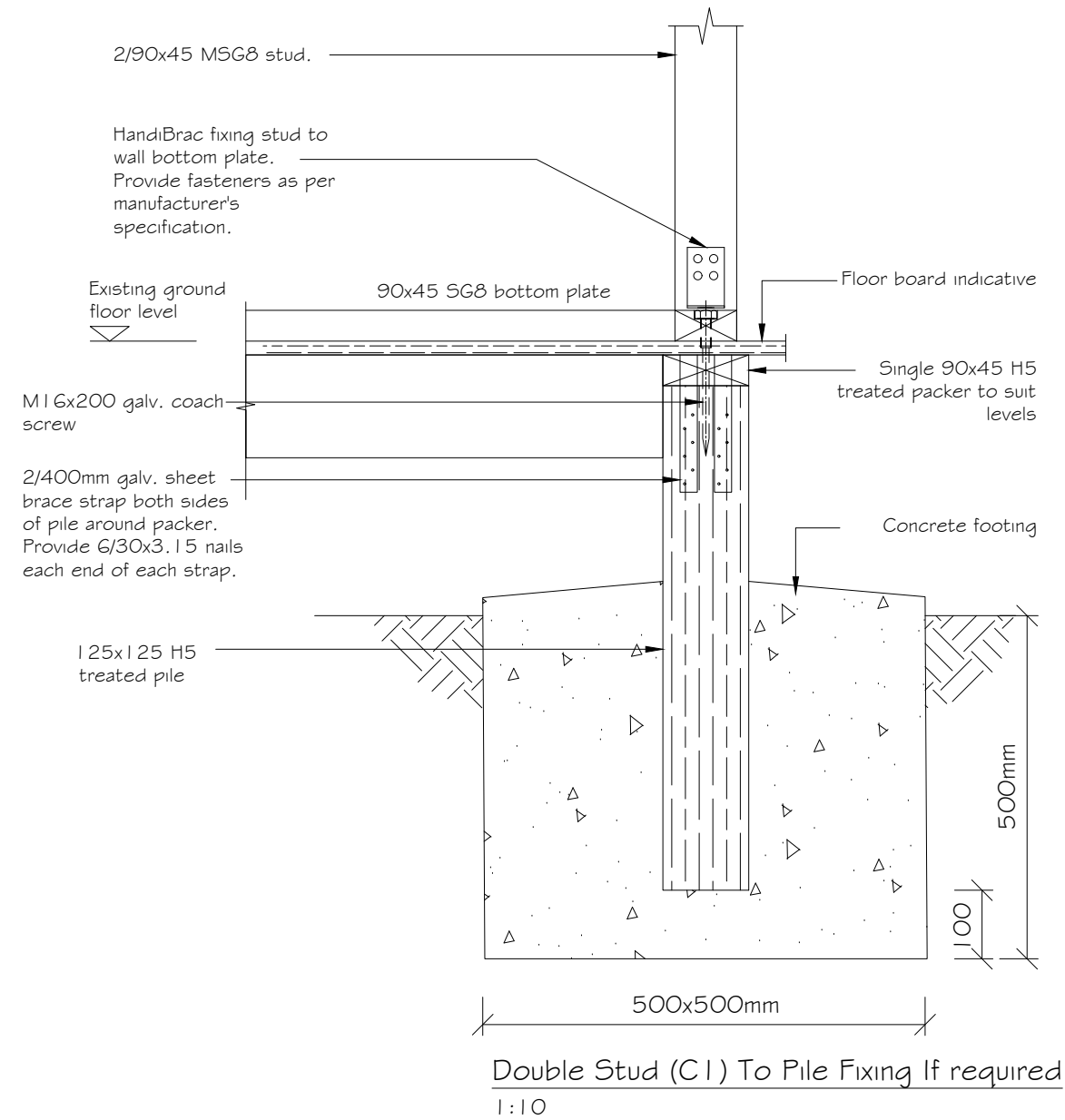
NOTE:  
ANY EXISTING STRUT TO ROOF RIDGE BOARD IS TO BE WELL CONNECTED TO THE NEW PFC BEAM

			<div><b>Cephas Rock Limited</b> Structural Engineers</div> <div>PO Box 37174 Christchurch 8425</div> <div>P: (03) 338 5387 E: admin@cephasrock.co.nz</div> <div>F: (03) 338 5389 www.cephasrock.co.nz</div>	Title: Proposed Renovation Design		Job no.: 25-122	Sheet: 54 of 6
				Address: 25 Flemington Avenue, North New Brighton, Christchurch			
				Client: Helio Jacundino c/- Viking Builders			
O		07-04-2025					
Rev.	Remark/Comment	Date					
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**B1 TO TRIPLE STUD C1 CONNECTION**  
**DETAIL**  
1:10



**Double Stud (C1) To Pile Fixing If required**  
1:10

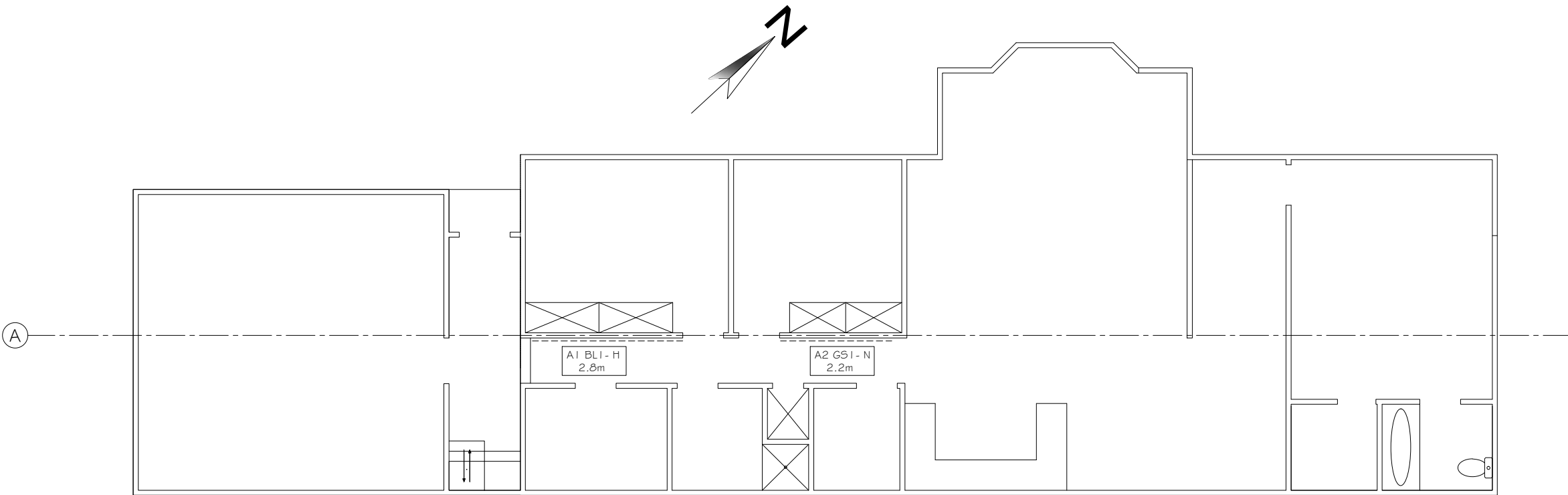
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				Address: 25 Flemington Avenue, North New Brighton, Christchurch	Client: Helio Jacundino c/- Viking Builders	Design: M.L.	
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Legend

GS1 -N    -10mm or 13mm GIB standard plasterboard to one side only.

BL1 -H    -10mm or 13mm GIB Braceline® to one side only.

NOTE:  
See proprietary manufacturers installation instructions for fixings.



GROUND FLOOR BRACING PLAN  
1 : 100

			<div><div><div><div></div></div><div>Cephas Rock Limited Structural Engineers</div></div><div><div>PO Box 37174 Christchurch 8425</div><div>P: (03) 338 5387 E: admin@cephasrock.co.nz</div><div>F: (03) 338 5389 www.cephasrock.co.nz</div></div></div>	Title: Proposed Renovation Design - Bracing		Job no.:	25-122	Sheet: 56 of 6	
				Address: 25 Flemington Avenue, North New Brighton, Christchurch		Client: Helio Jacundino c/- Viking Builders	Design:		M.L.
							Drawn:	M.L.	Original size: A3
O		07-04-2025					Approved:	J.W.	
Rev.	Remark/Comment	Date							

## PRODUCER STATEMENT – PS1 DESIGN

**BUILDING CODE CLAUSE(S):** B1/VM1, B1/AS1, B1/VM4

**JOB NUMBER:** 25-122

**ISSUED BY:** Cephass Rock Limited  
(Engineering Design Firm)

**TO:** Helio Jacundino c/- Viking Builders  
(Owner/Developer)

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

**IN RESPECT OF:** Foundation Re-leveling and Structural Repair and Renovation designs to Residential Building  
(Description of Building Work)

**AT:** 25 Flemington Avenue, North New Brighton, Christchurch  
(Address, Town/City)

**LEGAL DESCRIPTION:** Lot 79 DP 3484

N/A ☐

We have been engaged by the owner/developer referred to above to provide (Extent of Engagement):

Engineering Design, Drawings, Construction Monitoring

in respect of the requirements of the Clause(s) of the Building Code specified above for Part only, as specified in the Schedule, of the proposed building work.

The design carried out by us has been prepared in accordance with:

- ☒ Compliance documents issued by the Ministry of Business, Innovation & Employment (Verification method/acceptable solution) B1/VM1, B1/AS1, B1/VM4 and/or;
- ☐ Alternative solution as per the attached Schedule.

The proposed building work covered by this producer statement is described on the drawings specified in the Schedule, together with the specification, and other documents set out in the Schedule.

**On behalf of the Engineering Design Firm,** and subject to:

- Site verification of the following design assumptions: Cephass Rock Bearing Verification Report, Ref 25-122.
- All proprietary products meeting their performance specification requirements;

**I believe on reasonable grounds that:**

- the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the Schedule, will comply with the relevant provisions of the Building Code and that;
- the persons who have undertaken the design have the necessary competency to do so.

I recommend the CM 3 level of **construction monitoring**.

I, (Name of Engineering Design Professional) Joshua Wong, am:

- ☒ CPEng number 1007291 and hold the following qualifications BEng(Hons) CPEng IntPE(Aus)

The Engineering Design Firm holds a current policy of Professional Indemnity Insurance no less than \$200,000

The Engineering Design Firm is not a member of ACE New Zealand.

**SIGNED BY (Name of Engineering Design Professional):** Joshua Wong

(Signature below):



**ON BEHALF OF (Engineering Design Firm):** Cephass Rock Limited

Date: 07/04/2025

**Note:** This statement has been prepared solely for the Building Consent Authority named above and shall not be relied upon by any other person or entity. Any liability in relation to this statement accrues to the Engineering Design Firm only. As a condition of reliance on this statement, the Building Consent Authority accepts that the total maximum amount of liability of any kind arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in tort or otherwise, 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.

## SCHEDULE to PS1

Please include an itemised list of all referenced documents, drawings, or other supporting materials in relation to this producer statement below:

Cephas Rock Ltd, reference number: 25-122, Releveling and Proposed Renovation Design.

Cephas Rock Ltd, reference number: 25-122 VO1, Structural assessment.

## GUIDANCE ON USE OF PRODUCER STATEMENTS

Information on the use of Producer Statements and Construction Monitoring Guidelines can be found on the Engineering New Zealand website

<https://www.engineeringnz.org/engineer-tools/engineering-documents/producer-statements/>

Producer statements were first introduced with the Building Act 1991. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects (NZIA), Institution of Professional Engineers New Zealand (now Engineering New Zealand), Association of Consulting and Engineering New Zealand (ACE NZ) in consultation with the Building Officials Institute of New Zealand (BOINZ). The original suite of producer statements has been revised at the date of this form to ensure standard use within the industry.

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

**PS1 DESIGN** Intended for use by a suitably qualified independent engineering 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 engineering design review 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 3910:2013 or Schedules E1/E2 of NZIA's SCC 2011<sup>2</sup>

**PS4 CONSTRUCTION REVIEW** Intended for use by a suitably qualified independent engineering construction monitoring professional who either undertakes or supervises 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 ACE New Zealand and Engineering New Zealand to interpret the Producer Statement.

### Competence of Engineering Professional

This statement is made by an engineering 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 personnel.

The person signing the Producer Statement on behalf of the engineering firm will have a professional qualification and proven current competence through registration on a national competence-based register such as a Chartered Professional Engineer (CPEng).

Membership of a professional body, such as Engineering New Zealand provides additional assurance of the designer's standing within the profession. If the engineering firm is a member of ACE New Zealand, this provides additional assurance about the standing of the firm.

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

### Professional Indemnity Insurance

As part of membership requirements, ACE New Zealand 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 practice for the relationship between the BCA and the engineering firm.

### Professional Services during Construction Phase

There are several levels of service that an engineering firm may provide during the construction phase of a project (CM1-CM5 for engineers<sup>3</sup>). The building Consent Authority is encouraged to require that the service to be provided by the engineering 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.

### Refer Also:

- <sup>1</sup> Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2013
- <sup>2</sup> NZIA Standard Conditions of Contract SCC 2011
- <sup>3</sup> Guideline on the Briefing & Engagement for Consulting Engineering Services (ACE New Zealand/Engineering New Zealand 2004)
- <sup>4</sup> PN01 Guidelines on Producer Statements

[www.acenz.org.nz](http://www.acenz.org.nz)

[www.engineeringnz.org](http://www.engineeringnz.org)



# CERTIFICATE OF DESIGN WORK

## MEMORANDUM FROM LICENSED BUILDING PRACTITIONER

### Section 30C and Section 45, Building Act 2004

<b>The Building</b>	
Street address	25 Flemington Avenue, North New Brighton, Christchurch
Suburb	North New Brighton
Postcode	
Town/city	Christchurch
Building consent no.	
<b>The Owner</b>	
Name(s)	Helio Jacundino c/- Viking Builders
Email	info@vikingsbuilders.co.nz
Phone	02102279077
Address	

### Basis for providing this memorandum

I am providing this memorandum in my role as the **specialist** designer who carried out or supervised specific Primary structure elements of restricted building work (RBW) design work as described in this memorandum. Other designers will provide memoranda covering the remaining RBW design work. Refer also to the attached PSI.

### Identification of restricted building work (RBW) design work

I, **Joshua Wong** carried out or supervised the following RBW design work:

#### Primary structure: B1

Design work that is RBW	Description (as required) and reference to plans and specifications	Carried out or supervised
Foundations and subfloor framing ✓	Foundation Re-leveling Design and Structural Repair	Supervised
Retaining walls ✗		
Beams ✓	Structural beam and associated columns design	Supervised
Portal ✗		
Bracing ✓	Bracing design	Supervised
Other (primary) ✗		

Note: SED = Elements subject to Specific Engineering Design outside of the scope of NZS3604:2011, unless otherwise noted.

Initial JW Date 07/04/2025

## Waivers and modifications

Are waivers or modifications of the Building Code required?

No

If yes, please provide details of the waivers or modifications:

Building Code clause	Waiver/modification required
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## Issued by

Name	Joshua Wong	Design entity/company	Cephas Rock Limited
Chartered status	CPEng	Chartered no.	1007291
Email	admin@cephasrock.co.nz	Website	https://www.cephasrock.co.nz/
Phone (daytime)	03-3385387	Phone (after hours)	
Mobile			
Postal address	PO Box 37174, Halswell, Christchurch		
Physical address	Unit 1B/1 Stark Drive, Wigram		

## Declaration

I, Joshua Wong, LBP state that I have applied the skills and care reasonably required of a competent design professional in carrying out or supervising the RBW described in this memorandum and that based on this, I certify that the RBW described in this memorandum:

- complies with the Building Code; or
- complies with the Building Code subject to any waiver or modification of the Building Code described in this memorandum.

Signature



Date 07/04/2025

07 April 2025

Job No: 25-122

Helio Jacundino c/- Viking Builders  
[info@vikingsbuilders.co.nz](mailto:info@vikingsbuilders.co.nz)

Dear Helio,

**RE: STRUCTURAL REPAIR AND ALTERATION ASSESSMENT – 25  
FLEMINGTON AVENUE, NORTH NEW BRIGHTON, CHRISTCHURCH.**

Please find attached our documentation for the above project.

### **CONSTRUCTION MONITORING**

For dwelling repairs, we recommend a construction monitoring level “CM3”. This is an audit of a sample of work, rather than a detailed inspection of every component. On this project, we propose the following repairs:

#### **Structural repairs:**

1. Cut inspection for timber pile replacement of levelling and proposed beam.
2. Cut inspection for proposed underpinning pads.
3. Final inspection, including final floor levels, perimeter foundation wall repair, external cladding repair and other structural elements in our structural assessment report.
4. Pre-line inspection.

The number of inspections for the above will depend on the contractor's method of construction, concrete pour sequencing, etc. and shall be agreed with the contractor as the works progress.

A producer statement (PS4 Construction Review) will be issued once all the above inspections have been completed, and once a producer statement (PS3 Construction) or a Memorandum: Record of building work covering all structural items has been provided by the contractors involved.

We ask that the contractor notify us at least 24 hours in advance of all major items of work before they are concealed.

Please note we cannot accept photographs of building works prior to concealment as adequate evidence of construction unless where specifically requested by our engineer. Where requested, please provide ample photographs (10-20 photos per each stage of work) to demonstrate that works have been carried out to a satisfactory standard.

For any construction queries or inspection notifications, please contact our office.

Yours faithfully



**Joshua Wong**  
**BEng(Hons) CPEng (NZ and Aus) IntPE(Aus) NER APEC Engineer**

07 April 2025

Job No: 25-122

Helio Jacundino c/- Viking Builders

**RE: SOIL BEARING PRESSURE VERIFICATION FOR FOUNDATION RELEVELLING AND MINOR RENOVATION AT 25 FLEMINGTON AVENUE, NORTH NEW BRIGHTON, CHRISTCHURCH.**

We confirm that a shallow soil investigation was carried out by Cephas Rock Limited on 14 March 2025 at the above address and now report as follows.

**Test Description:**

The shallow soil investigation consisted of 2 dynamic cone penetrometer (DCP or also known as scala penetrometer) tests and 1 hand auger hole to determine the soil's ultimate bearing capacity. The test locations and results of the DCP tests are given on the attached test location plan.

**Findings:**

At all test locations the DCP test results showed penetration resistance of at least 2 DCP blows per 100mm penetration can be achieved at each test location from 400mm below NGL. This is equivalent to an inferred Ultimate Bearing Capacity (UBC) of 200 kPa.

Moreover, the DCP test results showed penetration resistance of at least 3 DCP blows per 100mm penetration can be achieved at each test location from 500mm below NGL. This is equivalent to an inferred Ultimate Bearing Capacity (UBC) of 276 kPa.

**Conclusions:**

A geotechnical ultimate bearing capacity of 200kPa and 276kPa are inferred to be achievable at approximately 400mm and 500mm depth below NGL, respectively.

Please note that the findings/conclusion provided above are based on a limited number of penetrometer tests and hand auger holes and the nature and continuity of subsoil conditions is inferred. It should be appreciated that actual conditions could vary from the test results.

Please do not hesitate to contact the undersigned should any further information be required.

Yours faithfully



**Joshua Wong**

Structural Engineer / Director

*BEng(Hons) CPEng (NZ and Aus) IntPE(Aus) NER*

*APEC Engineer*



Cephas Rock Limited  
Structural Engineers

PO Box 37171, Christchurch 8425  
Ph: 03-3385387, 0211031200  
Email: admin@cephasrock.co.nz

PROJECT: Shallow Soil Test

ADDRESS: 25 Flemington Avenue, North New Brighton, Christchurch

JOB NO: 25-122

DRAWN BY: ML

DATE: 14/03/2025

CHECKED BY: JW

PAGE:

SK 01

n ⊗ - Test Location

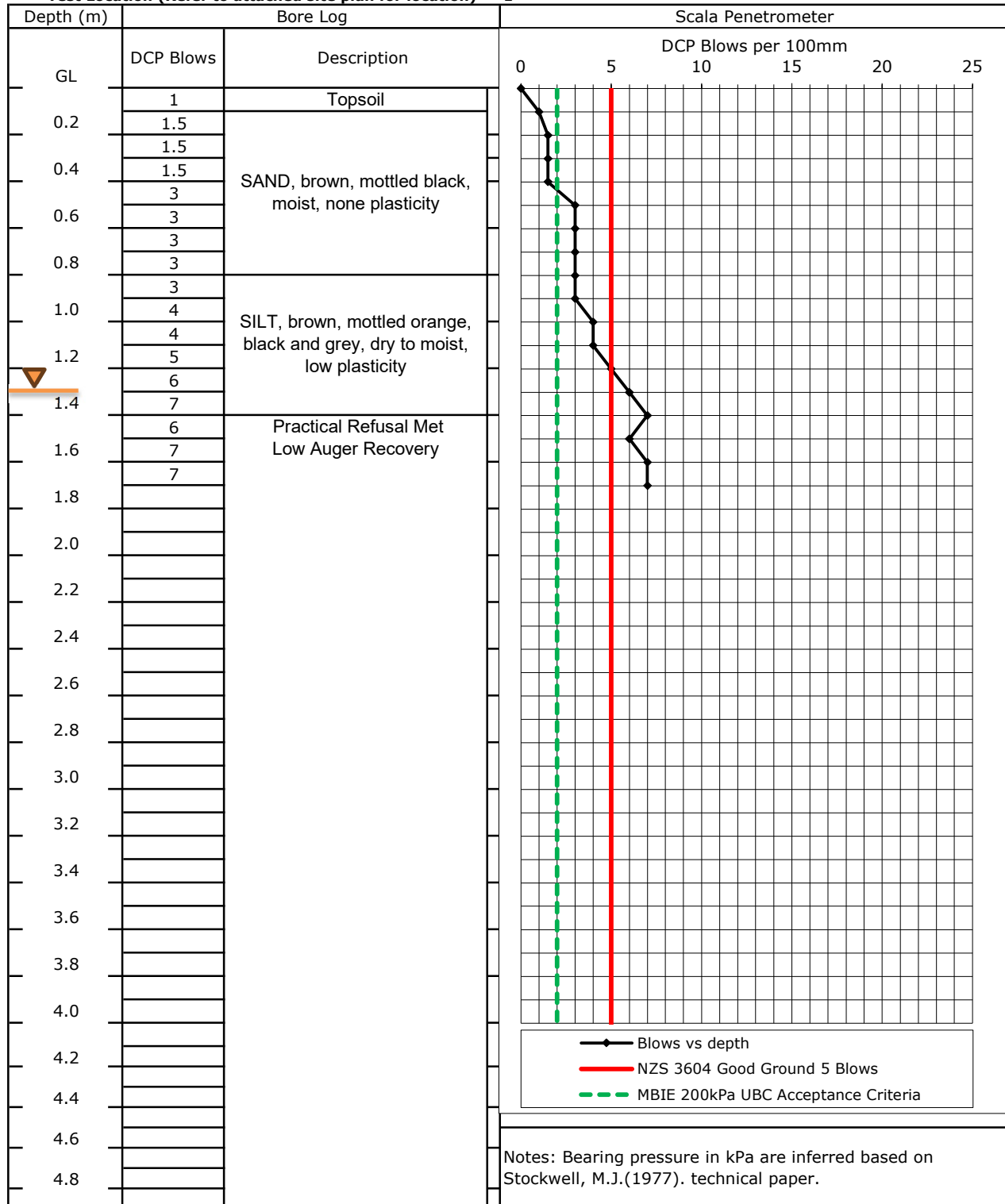


Test Location Plan  
(N.T.S.)

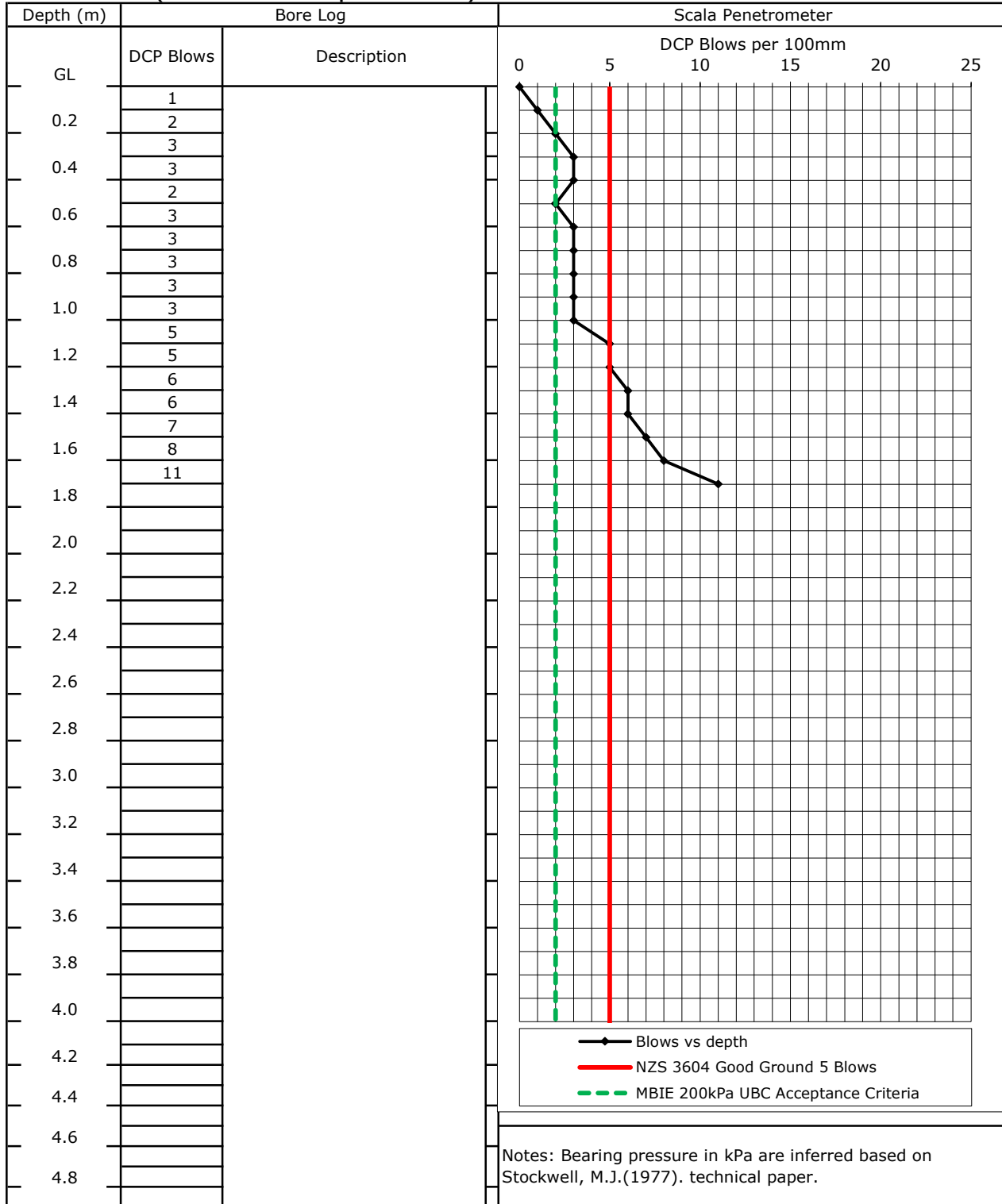




<b>project</b>	<b>25 Flemington Avenue, North New Brighton, Christchurch</b>	<b>no.</b>	<b>1</b>
<b>ref</b>	<b>25-122</b>	<b>date</b>	<b>14/03/2025</b>
<b>by</b>	<b>ML</b>	<b>checked</b>	<b>Joshua Wong</b>

**Test Location (Refer to attached site plan for location) 1**


<b>project</b>	<b>25 Flemington Avenue, North New Brighton, Christchurch</b>	<b>no.</b>	<b>2</b>
<b>ref</b>	<b>25-122</b>	<b>date</b>	<b>14/03/2025</b>
<b>by</b>	<b>ML</b>	<b>checked</b>	<b>Joshua Wong</b>

**Test Location (Refer to attached site plan for location) 2**


Job No.: 25-122 VO2

Job Name: Shallow Foundation Repairs

Job Location: 25 Flemington Avenue, North New Brighton

Job Description: Type B dwelling re-level

Engineer: ML

Type of design pad

#### Load Builder

Roof Load Width	4.90	m
First Floor Wall Height	0.00	m
First Floor Load Width	0.00	m
Ground Floor Wall Height	2.40	m
Ground Floor Load Width	1.50	m
Width of footing	0.30	m
Ground Bearing Capacity	200	kPa UBC
Geotechnical Report Firm		
Reference Number	25-122	
	100.00	

#### Load Cases

Load Case 1 - Strength <sup>1</sup>	1.2 G + 1.5Q
Load Case 2 - Strenght <sup>2</sup>	1.35 G
Load Case 3 - Lateral Mass	1.0 G + 0.3 Q
Load Case 4 - Service (short)	1.0 G + 0.4 Q
Load Case 5 - Service (long)	1.0 G + 0.7 Q
Load Case 6 - Vertical Eq	1.21G
Load Case 7 - Snow Loading	1.2G + Su + $\psi_c Q$ (0.4)

#### SINGLE STOREY DWELLING

Roof	kPa	kN/m	LC1	LC2	LC3	LC4	LC5	LC6	LC7
Pressed metal	0.150	0.735	0.882	0.992	0.735	0.735	0.735	0.889	0.882
Timber Roof Framing	0.080	0.392	0.470	0.529	0.392	0.392	0.392	0.474	0.470
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Roof Live Load	kPa	kN/m	LC1	LC2	LC3	LC4	LC5	LC6	LC7
Live traffic loading	0.250	1.225	1.838	0.000	0.368	0.490	0.858	0.000	0.490
Snow	0.900	4.410	0.000	0.000	0.000	0.000	0.000	0.000	4.410

Ceiling	kPa	kN/m	LC1	LC2	LC3	LC4	LC5	LC6	LC7
Roof Insulation	0.030	0.147	0.176	0.198	0.147	0.147	0.147	0.178	0.176
Framing (90x45 @ 450 + Noggins)	0.060	0.294	0.353	0.397	0.294	0.294	0.294	0.356	0.353
13mm plasterboard (standard)	0.180	0.882	1.058	1.191	0.882	0.882	0.882	1.067	1.058
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

DO NOT FILL	kPa	kN/m	LC1	LC2	LC3	LC4	LC5	LC6	LC7
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

DO NOT FILL	kPa	kN/m	LC1	LC2	LC3	LC4	LC5	LC6	LC7
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

DO NOT FILL	kPa	kN/m	LC1	LC2	LC3	LC4	LC5	LC6	LC7
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

DO NOT FILL	kPa	kN/m	LC1	LC2	LC3	LC4	LC5	LC6	LC7
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

DO NOT FILL	kPa	kN/m	LC1	LC2	LC3	LC4	LC5	LC6	LC7
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Ground Floor Wall	kPa	kN/m	LC1	LC2	LC3	LC4	LC5	LC6	LC7
Timber studs @ 400 cts	0.088	0.211	0.253	0.285	0.211	0.211	0.211	0.256	0.256
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Ground Floor Wall Lining	kPa	kN/m	LC1	LC2	LC3	LC4	LC5	LC6	LC7
13mm plasterboard (braceline)	0.122	0.293	0.351	0.395	0.293	0.293	0.293	0.354	0.354
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Ground Floor Wall Cladding	kPa	kN/m	LC1	LC2	LC3	LC4	LC5	LC6	LC7
8mm FC Sheet	0.150	0.360	0.432	0.486	0.360	0.360	0.360	0.436	0.436
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Ground Floor	kPa	kN/m	LC1	LC2	LC3	LC4	LC5	LC6	LC7
90x70 bearers @ 1600 cts	0.050	0.075	0.090	0.101	0.075	0.075	0.075	0.091	0.090
carpet	0.030	0.045	0.054	0.061	0.045	0.045	0.045	0.054	0.054
90x45 joists @ 450 cts	0.110	0.165	0.198	0.223	0.165	0.165	0.165	0.200	0.198
20mm flooring	0.200	0.300	0.360	0.405	0.300	0.300	0.300	0.363	0.360
Insulation	0.020	0.030	0.036	0.041	0.030	0.030	0.030	0.036	0.036
-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Ground Floor Live	kPa	kN/m	LC1	LC2	LC3	LC4	LC5	LC6	LC7
Residential	1.500	2.250	3.375	0.000	0.675	0.900	1.575	0.000	0.900

Concrete Foundations	-	kN/m	LC1	LC2	LC3	LC4	LC5	LC6	LC7
450Dx300W Edge Thickening		3.308	3.969	4.465	3.308	3.308	3.308	4.002	4.002

	LC1	LC2	LC3	LC4	LC5	LC6	LC7	
TOTAL	13.90	9.77	8.28	8.63	9.67	8.76	14.53	kN/m
TOTAL	46.32	32.56	27.60	28.76	32.23	29.19	48.42	kPa on Soil

UDL 13.8963 kN/m A pad at least: 527.1869 mm Square  
 Pad Spacing 2 m  
 Load on Pad 27.7926 kN  
 Pad size 550 mm  
 Pad Capacity 30.25 kN

**Job Number:** 25-122 VO2  
**Job Name:** 25 Flemington Avenue, North New Brighton  
**Description:** Internal Pile Replacement Check  
**Date:** 7-Apr-25  
**Designer:** ML

#### Input Data

G load	Load (kPa)	Load D1 (m)	Load D2 (m)	Load (kN)
Roof	0.00	2.00	3.00	0.00
Wall	0.40	1.30	2.60	1.35
Foundation	0.00	2.00	0.24	0.00
Pad	9.60	0.50	0.50	2.40
Floor	0.50	1.30	1.30	0.85
				0.00
				0.00

#### UNFACTORED LOADS

Q Load				
Roof	0.00	2.00	3.00	0.00
Floor	1.50	1.30	1.30	2.54
				0.00

Su Load				
Roof	0.00	2.00	3.00	0.00

Wu				
Roof	0.00	2.00	3.00	0.00

#### Loads

Dead, G 4.60 kN  
 Live, Q<sub>b</sub> 2.54 kN  
 Snow, S<sub>s</sub> 0.00 kN  
 Wind Uplift Serv, W<sub>serv</sub> 0.00 kN  
 Wind Uplift Ult, W<sub>ult</sub> 0.00 kN

#### Soil Data

Allowable soil bearing capa 67 kPa  
 Ultimate soil bearing capac 200 kPa  
 @ 400 depth

#### Ultimate

##### Load Combinations

1.35G 6.21 kN  
 1.2G&1.5Q 9.32 kN  
 0.9G&Wu 4.14 kN  
 1.2G&S<sub>u</sub>&ψ<sub>c</sub>Q 6.53 kN

Critical Case 9.32 kN

#### Serviceability

##### Load Combinations

G 4.60 kN  
 G&ψ<sub>f</sub>Q 5.61 kN  
 G&ψ<sub>s</sub>Q 6.37 kN  
 G&ψ<sub>s</sub>S 4.60 kN  
 G&W<sub>s</sub> 4.60 kN

Critical case 6.37 kN

Pad size: 500 mm diameter  
 A = 0.19634954 m<sup>2</sup>

Ps/s = 32.4 kPa  
 Puls = 47.5 kPa

450.00 mm square  
 A = 0.2025 m<sup>2</sup>

Min. Pad Area (ULT) 0.0466 m<sup>2</sup>  
 Min. Pad Area (SLT) 0.0956 m<sup>2</sup>

Hence the minimum pad size is 0.3488 m (circular pad)  
 0.3091 m (square pad)

Provide 350 square x350mm (D) pile footing



**Job Number:** 25-122 VO2  
**Job Name:** 25 Flemington Avenue, North New Brighton  
**Description:** External Pile Replacement Check  
**Date:** 7-Apr-25  
**Designer:** ML

### ***Input Data***

G load	Load (kPa)	Load D1 (m)	Load D2 (m)	Load (kN)
Roof	0.80	1.50	1.50	1.80
Wall	0.80	1.50	2.40	2.88
125 square pile	8.25	0.13	0.13	0.13
Footing 500 deep	12.00	0.13	1.00	1.51
Floor	0.50	1.50	1.50	1.13
				0.00
				0.00

Q Load				
Roof	0.25	1.50	1.50	0.56
Floor	1.50	1.50	1.50	3.38
				0.00

<b>Su Load</b>				
Roof	0.90	1.50	1.50	2.03

<b>Wu</b>				
Roof	-1.50	1.50	1.50	-3.38

### ***Loads***

Dead, G	7.44 <i>kN</i>
Live, Q <sub>b</sub>	3.94 <i>kN</i>
Snow, S <sub>s</sub>	2.03 <i>kN</i>
Wind Uplift Serv, W <sub>serv</sub>	-2.26 <i>kN</i>
Wind Uplift Ult, W <sub>ult</sub>	-3.38 <i>kN</i>

## Soil Data

Allowable soil bearing capacity	92 kPa
Ultimate soil bearing capacity	276 kPa
	500 depth

***Ultimate***

### Load Combinations

1.35G	10.05 <i>kN</i>	Critical Case	14.84 <i>kN</i>
1.2G&1.5Q	14.84 <i>kN</i>		
0.9G&W <sub>u</sub>	3.32 <i>kN</i>		
1.2G&S <sub>u</sub> & $\psi_c$ Q	12.53 <i>kN</i>		

### ***Serviceability***

### Load Combinations

G	7.44 kN	Critical case	10.20 kN
G&ψ <sub>I</sub> Q	9.02 kN		
G&ψ <sub>s</sub> Q	10.20 kN		
G&ψ <sub>s</sub> S	8.82 kN		
G&W <sub>s</sub>	9.70 kN		

Pad size:                      400 mm diameter                      PsIs =                      81.2 kPa  
A =                      0.1256637 m<sup>2</sup>                      Puls =                      118.1 kPa

350.00 mm square  
A = 0.1225 m<sup>2</sup>

Min. Pad Area (ULT)	0.0538 m <sup>2</sup>
Min. Pad Area (SLT)	0.1108 m <sup>2</sup>

[illegible]

**Provide 400mm diameter circular or 350mm square pile footing @ 500mm depth**



# CALCULATION SHEET

PAGE No:

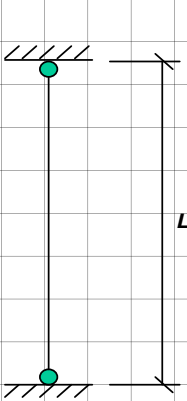
SECTION : **Post design - Section #**  
**C1 Timber Post**

JOB No: **25-122** DESIGNED: **ML**  
DATE: **Apr-25** CHECKED : **JW**

## .3. **TIMBER POST DESIGN TO NZS 3603;1993**

Beam: **B1**

### .3.1. **STABILITY CHECK**



$$N_c = 28.0 \text{ [kN]}$$

$$L = 2500 \text{ [mm]}$$

From NZS 3603 - Cl. 3.3.4:  $N_c < \phi N_{ncx}$  and  $N_c < \phi N_{ncy}$  shall be satisfied.

$$\phi N_{ncx} = \phi k_1 k_8 f_c A_p \cdot 10^{-3}$$

-  $k_8$  is calculated using  $S_2$

$$\phi N_{ncy} = \phi k_1 k_8 f_c A_p \cdot 10^{-3}$$

-  $k_8$  is calculated using  $S_3$

With:  $f = 0.8$

$$k_1 = 0.6$$

- Load Reduction Factor

$$k_{10} = 1.0$$

- Pinned Post - Fig. 3.5

$$f_c = 18 \text{ MPa}$$

- strength parallel to the grain

$$f_p = 8.9 \text{ MPa}$$

- strength perpendicular to the grain

Try **3/90x45** Post with

$$b = 90 \text{ [mm]}$$

$$d = 135 \text{ [mm]}$$

$$\text{Section Area } A = 12.15 \cdot 10^3 \text{ [mm}^2\text{]}$$

Calculate Slenderness Factors  $S_2$  and  $S_3$ :

$$S_2 = k_{10} L / d = 27.8$$

$$K_{8S2} = 0.407$$

$$S_3 = k_{10} L / b = 18.5$$

$$K_{8S3} = 0.775$$

The critical forces then are:

$$\phi N_{ncx} = \phi k_1 k_8 f_c A_p \cdot 10^{-3} = 42.7 \text{ [kN]}$$

$$\phi N_{ncy} = \phi k_1 k_8 f_c A_p \cdot 10^{-3} = 81.4 \text{ [kN]}$$

Showing that  $N_c = 28.00 \text{ [kN]} < \phi N_{ncx} = 42.74 \text{ [kN]}$  holds, and

$N_c = 28.00 \text{ [kN]} < \phi N_{ncy} = 81.40 \text{ [kN]}$  holds, hence

**Stability check is OK!**

### .3.2. **CHECK BEARING - Post section.**

From NZS 3603 - Cl. 3.2.9:  $N_b < \phi N_{nb}$ , where  $N_b = N_c = 28 \text{ [kN]}$

Parallel to the grain -  $\phi N_{nbl} = \phi k_1 f_c A_p \cdot 10^{-3} = 105.0 \text{ [kN]}$

Showing that  $N_b = 28.00 \text{ [kN]} < \phi N_{nbl} = 104.98 \text{ [kN]}$  holds, hence

**Check Bearing - Post Cross Section - is OK!**

### .3.3. **CHECK BEARING - Bottom Plate.**

From NZS 3603 - Cl. 3.2.9:  $N_b < \phi N_{nb}$ , where  $N_b = N_c = 28.0 \text{ [kN]}$

Perpendicular to the grain -  $\phi N_{nbp} = \phi k_1 f_p A_p \cdot 10^{-3} = 51.9 \text{ [kN]}$

Showing that  $N_b = 28.00 \text{ [kN]} < \phi N_{nbp} = 51.90 \text{ [kN]}$  holds, hence

**Check Bearing - Bottom Plate - is OK!**

Summary: Provide **3/90x45** Post for beam **B1** support.

**Job Number:** 25-122  
**Job Name:**  
**Description:** Internal Pile Design for Beam 1  
**Date:** 7-Apr-25  
**Designer:** ML

#### Input Data

G load	Load (kPa)	Load D1 (m)	Load D2 (m)	Load (kN)
Roof	0.50	1.50	0.00	0.00
Wall	0.30	0.00	2.40	0.00
125 square pile	8.25	0.13	0.13	0.13
Footing 500 deep	12.00	0.24	1.00	2.85
Floor	0.50	1.50	1.50	1.13
Reaction from B1	28.00	1.00	1.00	28.00
				0.00

Q Load				
Roof	0.25	1.50	0.00	0.00
Floor	1.50	1.50	1.50	3.38
				0.00

Su Load				
Roof	0.90	1.50	0.00	0.00

Wu				
Roof	-1.50	1.50	0.00	0.00

#### Loads

Dead, G 32.10 kN  
 Live, Q<sub>b</sub> 3.38 kN  
 Snow, S<sub>s</sub> 0.00 kN  
 Wind Uplift Serv, W<sub>serv</sub> 0.00 kN  
 Wind Uplift Ult, W<sub>ult</sub> 0.00 kN

#### Soil Data

Allowable soil bearing capa 92 kPa  
 Ultimate soil bearing capac 276 kPa  
 500 depth

#### Ultimate

##### Load Combinations

1.35G 25.02 kN  
 1.2G&1.5Q 27.30 kN  
 0.9G&Wu 16.68 kN  
 1.2G&S<sub>u</sub>&ψ<sub>c</sub>Q 23.59 kN  
 Critical Case 27.30 kN

#### Serviceability

##### Load Combinations

G 18.53 kN  
 G&ψ<sub>f</sub>Q 19.88 kN  
 G&ψ<sub>s</sub>Q 20.90 kN  
 G&ψ<sub>s</sub>S 18.53 kN  
 G&W<sub>s</sub> 18.53 kN  
 Critical case 20.90 kN

Pad size: 550 mm diameter  
 A = 0.23758294 m<sup>2</sup>  
 Ps/s = 88.0 kPa  
 Puls = 114.9 kPa

500.00 mm square  
 A = 0.25 m<sup>2</sup>

Min. Pad Area (ULT) 0.0989 m<sup>2</sup>  
 Min. Pad Area (SLT) 0.2271 m<sup>2</sup>

Hence the minimum pad size is 0.5378 m (circular pad)  
 0.4766 m (square pad)

**Provide 550mm diameter circular or 500mm square pile footing @ 500mm depth**

28 March 2025

Job No: 25-122 VO1

Helio Jacundino c/- Viking Builders  
[info@vikingsbuilders.co.nz](mailto:info@vikingsbuilders.co.nz)

Dear Helio

**RE: STRUCTURAL ASSESSMENT – 25 FLEMINGTON AVENUE, NORTH NEW BRIGHTON, CHRISTCHURCH.**

We confirm that a structural assessment was carried out by Cephas Rock Limited on 28 March 2025 at the above property. Our assessment included a visual inspection of the exterior and interior of the building to determine the extent of any structural damage caused by the Canterbury Earthquake Sequence (CES) from September 2010 up to the inspection date.

**BUILDING DESCRIPTION**

The building is a single storey dwelling with an attic located at 25 Flemington Avenue, North New Brighton, Christchurch. The dwelling is believed to have been built circa 1980 and has a composite foundation system.

- The main dwelling appears to have suspended timber floor founded upon concrete piles, (Type A foundation as per the MBIE Guidance).
- The garage and entry area is founded upon a concrete slab on grade foundation with perimeter foundation walls (Type C foundation as per the MBIE Guidance).
- A small portion of the house appears to have suspended timber floor founded upon concrete piles, and a concrete perimeter foundation wall as indicated in the floor level plan (Type B foundation as per the MBIE Guidance).

The dwelling superstructure consists of timber-framed walls and exterior is clad with light weight fibre cement. The roof is clad with pressed metal sheet.

The site is classified as “Green Zone, Technical Category 3, blue” area as given by the Ministry of Business, Innovation and Employment (MBIE). This indicates that moderate to significant land damage from liquefaction is possible in future large earthquakes.

EQC liquefaction and lateral spreading observations show “no observations (uncoloured)” following the September 2010 earthquake event and show “no lateral spreading but minor to moderate quantities of ejected material” following the February 2011 earthquake event. Site specific bearing verification investigation was undertaken as part of this assessment.



## OBSERVED DAMAGE

### *Exterior*

There are some minor cracks and deterioration have been observed to the external cladding and the external door framing. However, we note that due to limited ground clearance between the bottom of the external cladding and natural ground, and presence of external amenities and vegetation, parts of the foundation of the dwelling could not be investigated during our site inspection.

### *Interior*

During inspection, minor cracking damage to the interior was observed within the building as follows:

- Some minor cracks were observed to the wall lining and near the openings.
- Minor separation was observed to the timber skirting.
- Minor cracks were observed to the ceiling.

### *Roof*

A limited visual assessment of the roof from the ground level and from the ceiling opening to the roof cavity identified no evidence of earthquake-related damage where readily visible.

### *Floor*

A floor level survey using Zip-Level Pro-2000 instrument of a typical accuracy of  $\pm 3\text{mm}$  was carried out during the inspection and is presented in the Floor Level Plan attached in this report. It should be noted that the purpose of the floor level survey is to provide assistance in determining possible structural damage of the building and therefore should be treated as indicative only. Where a high-level dependence and an accurate and credible presentation of the survey information are required, a registered professional surveyor should be engaged to carry out the survey.

### *Attic Floor*

The floor levels measured across the attic floor of the building footprint showed a maximum floor level variation of 42mm (-32, +10). The overall floor level variation does not exceed the 50mm tolerance for floor variation recommended in Table 2.3 of the MBIE Guidance. However, some locations were observed to exceed the 1:200 (0.5%) MBIE tolerance for local floor slopes. The floor slopes are generally sloping down from northeast towards southwest.

### ***Ground Floor***

The floor levels measured across the garage and entry (concrete area) of the building footprint showed a maximum floor level variation of 42mm (-32, +10). The overall floor level variation does not exceed the 50mm tolerance for floor variation recommended in Table 2.3 of the MBIE Guidance. However, some locations were observed to exceed the 1:200 (0.5%) MBIE tolerance for local floor slopes.

The ground floor (timber area) levels measured across the dwelling footprint showed a maximum floor level variation of 120mm (-116, +4). The floor level variation of the dwelling exceeds the 50mm tolerance for floor variation recommended in Table 2.3 of the MBIE Guidance. At the same time, multiple localised floor slopes exceeding 1:200 (0.5%) were identified within the building. The floor slopes are generally sloping down from northeast towards southwest.

Based on above measurements, the dwelling falls into the "foundation rebuild indicated" category based on MBIE.

Limited verticality measurements of the external walls (measured from the interior) were undertaken (Average 6mm/m) and showed that the plumbness of the majority of the walls do not exceed the MBIE tolerance of 10mm per story.

### ***Subfloor Space***

The subfloor was accessed through a manhole in the floor. Due to the subfloor clearance, only limited access was possible. The subfloor showing a timber floor founded upon concrete piles and one minor portion of the foundation has concrete perimeter foundation. The condition of the subfloor piles appeared to be consistent with the age of the building. It has been observed that steel wire connection and no DPC are present at the pile to bearer interface. Non-compliant bearer notching observed, there was no splice plates.

## **CONCLUSIONS AND REMEDIATIONS**

It was observed that the building has sustained minor to moderate structural damage, predominately to the floor levels and perimeter foundation. We consider that the current state of the dwelling can provide sufficient structural integrity for immediate use. However, we recommend the following structural repairs to the building for continued occupancy and tenancy:

The dwelling contains three different levels: a garage concrete slab, a raised concrete slab (entrance), and a timber floor (the highest level). Due to the nature of the mixed foundation, the garage should be treated as separate foundation. The timber framing at the joint location of the concrete slab and timber floor should be repaired or re-framed after the re-levelling work.

For the timber floor:

- As stated above and based on MBIE Guidance, the floor falls into the "rebuild" category. However, since most undulations did not occur near the perimeter foundation walls, we consider it acceptable to re-level the perimeter foundation walls in accordance with Option 1 of the MBIE Guidance (Part A, Appendix A1.1.2).
- The timber floor may be re-levelled to meet target tolerances by performing local jacking and packing repairs to internal dwelling piles. Any pile requiring more than 100mm of packing should be replaced with a new pile.
  - If New H5 timber piles are required, it should be installed under bearers and with concrete poured to pile hole. Size and depth of excavation for pile hole along existing bearer line to confirmed by structural engineer after confirmation of bearing strength.
  - The size and spacing of jacking pads should be designed by a structural engineer prior to any construction. The soil conditions need to be confirmed by a geotechnical engineer prior to any construction.
  - Where packing is required to a pile over a joint in bearers, ensure connections provided to both bearers.
  - Adequate fixing of packing, installation of DPC, and pile-to-bearer connections, should be installed to all affected piles as per MBIE guidelines.
  - Minor notching to subfloor bearers may be carried out, and flitch plates should be installed as per MBIE guidelines.
  - Our recommended target tolerances are within 25mm overall floor level variation with local floor slopes not exceeding 1:200.

For the Concrete floor:

- The dwelling concrete floor can be re-levelled by mechanical lifting using portable jacks as per Option 1 of the MBIE Guidance: Part A, Appendix A1.1.3. The foundation re-levelling shall be designed, approved and monitored by a qualified structural engineer. Any voids underneath the concrete slab caused by foundation re-levelling shall be filled with flowable grout.
  - Alternatively, the floor can be re-levelled using Sika Floor Levelling Compound (or equivalent product approved by engineer). It shall be noted that the floor levelling compound can only address the floor levels to achieve the serviceability purpose and will not improve the structural integrity of the subfloor structure. Minor judicious grinding to the concrete slab (max 10mm) can also be used.
  - The maximum thickness of the floor levelling compound layer is 50mm.

#### For Attic Floor:

- For serviceability purposes only, local re-levelling of floor slopes exceeding 1:200 MBIE tolerance in the timber floor may be rectified with the addition of new timber joists of equivalent size and ripping of new timber wedges to lay directly over existing joists, then re-lay with new Strandboard floor panels. Fasteners and adhesives in accordance with manufacturer's specifications.
  - Alternatively, minor judicious use of latex floor levelling compound to timber floor, feathered out from the edge of floorboards, may be used.
- Our recommended target tolerances are within 25mm overall floor level variation with local floor slopes not exceeding 1:200.
- It shall be understood that the foundation of this dwelling has suffered a combination of earthquake-related settlement and historical settlement. As such, the foundation re-levelling works shall be performance based, which means:
  - Although every effort is made to re-level the dwelling to the required performance standard (to within the level variations of accepted tolerance), in many cases, it may be found impractical to achieve that, because to do so may cause undue and unnecessary additional stress upon the superstructure.
- Full penetration epoxy injection repairs (Sikadur 52 or equivalent) shall be carried out to any concrete perimeter foundation crack and concrete slab crack widths less than 10mm, cementitious grout injection repairs (Ramset PoziLite HB/ PoziCote FR or equivalent approved) to perimeter foundation crack widths between 10mm and 20mm. Failed or substandard repairs should be ground out and re-repaired.
- Where diagonal cracks from corners of openings are less than 50mm long and cracks or separations are typically along sheet joints, re-stop to the wall (Fibafuse) and ceiling plasterboard. Installation of new fasteners required around the plasterboard sheet perimeter where fasteners have pulled through or plaster bulges around fastener heads.
- Where diagonal cracks from corners of openings are exceeding 50mm length or panel fractured, replacement of wall and ceiling plasterboard with equivalent bracing elements (GIB Braceline) is recommended. Installation new fasteners to be in a bracing pattern around the plasterboard sheet perimeter in accordance with manufacturer's guidelines.
- Once the foundation has been re-levelled and repaired, the non-structural elements, such as doors, misalignment of the existing windowsills, external amenities etc., should be assessed and remediated by a suitably qualified person as required.

It should be noted that this assessment was not intended to be a full scope of repairs and therefore should not be treated as such. The photos exhibited in the appendix do not necessarily constitute the entirety of the damage found upon inspection. As this is a qualitative report that provides general repair methods, the appendix merely exhibits an example of the types of damage found. It is up to the contractor to thoroughly inspect for all damage that requires repair.

Please refer to the MBIE Guidance and manufacturer's specifications for detailed repair methodologies. The suitability for occupancy must be re-assessed by a structural engineer after any future moderate earthquakes. It should be noted that this assessment was not intended to be a full scope of repairs and therefore should not be treated as such.

Inspection and report by,



**Mingkeng Li**  
Structural Engineer  
*BEngTech (Civil)*

Inspection and verified by,



**Joshua Wong**  
Structural Engineer / Director  
*BEng(Hons) CPEng (NZ and Aus) IntPE(Aus) NER  
APEC Engineer*

## Disclaimer:

1. This report has been prepared on behalf of and for the exclusive use of Helio Jacundino c/- Viking Builders and is subject to and issued in accordance with the provisions of the contract between Cephas Rock Limited and Helio Jacundino c/- Viking Builders. Cephas Rock accepts no liability or responsibility, whatsoever, for or in respect of any use or reliance upon this report by any third party.
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3. The above report does not constitute our confirmation that the building is “safe”, “earthquake resistant” or similar. We have not checked the level of actual structural compliance with the current Building Code, nor assessed the level of actual past seismic activity at the particular site on which the building is situated. We have carried out visual non-destructive inspection of readily accessible areas and have used our professional judgement to assess the extent of structural earthquake damage (if any) sustained from 4 September 2010 to date. We are unable to predict the severity of any future seismic activity on your site, and how the building and site may perform in such an event, or series of events. If engaged to do so, we can carry out further structural investigation (which may include invasive methods) and desktop analysis work to ascertain level of structural compliance of the building in its current state and identify structural vulnerabilities (if any) that may compromise the building’s structural performance in the future. No assessment relating to weathertightness has been made, and it should be performed by a weathertightness specialist if required.
4. The scope of any foundation re-levelling is to return the building foundations to as close to as reasonably practicable to its structural pre-earthquake condition (i.e., NZBC Section 112 repair). This clause states that the repair strategy does not have to improve the overall performance of the structure; rather it cannot be made any worse than it was prior to the earthquake sequence. The re-levelling of the foundations will not lead to any “betterment” of the existing foundation structure. Similar performance is likely to be observed, should we experience a further significant seismic event.

### *Reference*

Canterbury Geotechnical Database. Earthquake Commission (EQC) Liquefaction interpreted from aerial photography. (Data supplied by Tonkin and Taylor for Canterbury Earthquake Recovery Authority)

Canterbury Maps. (2024). Property Search. <https://propertysearch.canterburymaps.govt.nz/#/>

Ministry of Business, Innovation and Employment (MBIE). (2012). Repairing and rebuilding of houses affected by the Canterbury earthquakes – Technical Guidance (Part A). <https://www.building.govt.nz/building-code-compliance/canterbury-rebuild/repairing-and-rebuilding-houses-affected-by-the-canterbury-earthquakes/> Wellington, New Zealand.

Property Search. <https://propertysearch.canterburymaps.govt.nz/>



## Appendix



Photo 1. 25 Flemington Avenue North New Brighton, 8083 (Property Search).

Photo 2. Front view of the building.



Photo 3. EQC liquefaction and lateral spreading observations show “no observations (uncoloured)” following the September 2010 earthquake event and show “no lateral spreading but minor to moderate quantities of ejected material” following the February 2011 earthquake event. Site specific bearing verification investigation was undertaken as part of this assessment.



Photo 4. Minor crack observed to the external cladding.



Photo 5. Minor crack observed to the external cladding.



Photo 6. Minor deterioration observed to the external door framing.



Photo 7. Minor crack observed to the wall lining under the window.



Photo 8. Minor crack observed to the wall lining.



Photo 9. Minor crack observed to the wall lining under the window.



Photo 10. Minor vertical crack observed to the wall lining above the window.



Photo 11. Minor horizontal crack observed to the wall lining under the window.



Photo 12. Minor vertical crack observed to the wall lining under the window.



Photo 13. Minor crack and previous repair have been observed to the ceiling.

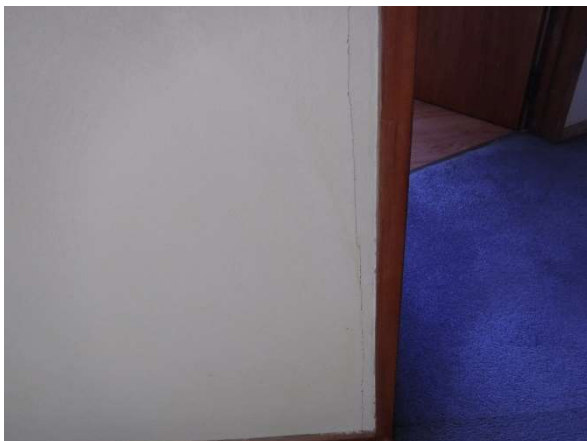


Photo 14. Minor crack observed to the wall lining near the door.



Photo 15. Minor separation observed to the timber skirting.





Photo 16. View of roof space.



Photo 17. View of roof space.



Photo 18. View of subfloor.



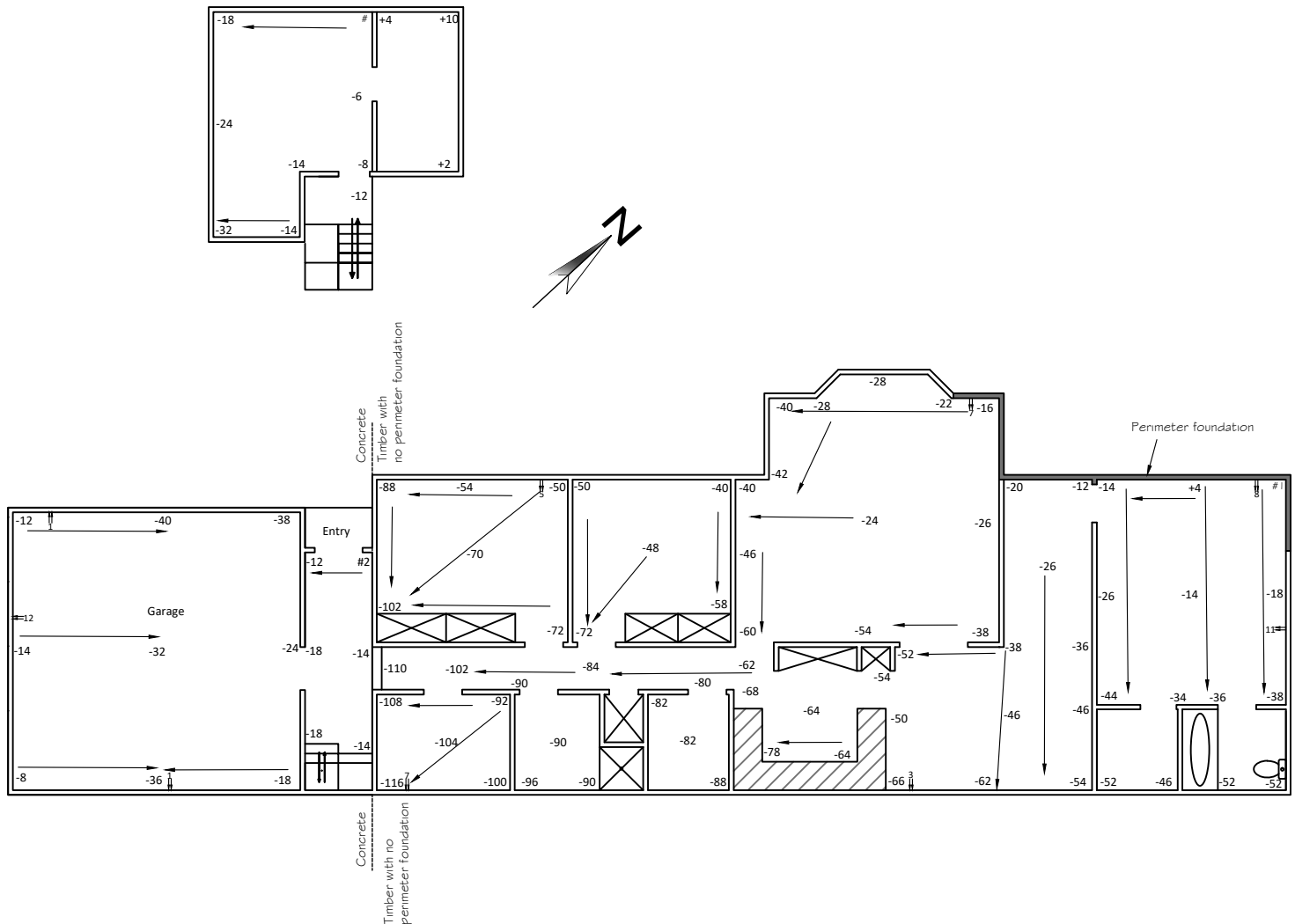
Photo 19. Non-compliant bearer notching observed, there was no splice plates.



Photo 20. Steel wire connections and no DPC were observed at the pile to bearer interface.



Photo 21. Steel wire connections and no DPC were observed at the pile to bearer interface.



## FLOOR LEVEL SURVEY PLAN (NTS)

### Note :

- 1) Measurements location are approximate and indicative only and not to scale.
- 2) Levels indicated are in millimeters.
- 3) Instrument used for measurement has a rated accuracy of +/- 3.0mm (ZIP level Pro 2000). Other sources of variation to the measurements can include construction tolerances, carpet, wear, and atmospheric temperature changes.
- 4) All measurements have been adjusted to the floor covering type at the datum.
- 5) Reference point zero millimeter denoted as "#".
- 6) Wall horizontal verticality displacements (mm/m) denoted as "≡" (indicative only)

The relative floor level differences between the highest and lowest points are:

Ground floor (timber area): 120(-116, +4). First floor: 42(-32, +10).

Garage & Entry (concrete area): 40(-40, 0).

## **BUILDER DETAILS**

Helio Jacundino of Viking Builders Limited will be carrying out the work. He has had 10+ years' experience in construction.

LBP: 133469

He will be providing a PS3 for the completed work.