B1 Ground Report

SUBTERRA
Geotechnical Investigation

Geotechnical Report for Proposed Additions

16-18 Kitchener Place, Opawa

Prepared for Dave Luhrs

Report version A released 25/09/2025

Report prepared by:

Bradley Drayson
Engineering Geologist
BSc (Earth Science)

Report reviewed by:

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MSc, MEngNZ

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CPEng (Geotechnical), CMEngNZ, IntPE(NZ)

Limitations of Report

This report is for the use of the client listed above and is not intended to be used by other parties without the express written permission of Subterra in advance.

To the extent permitted by law, Subterra accepts no liability for any cost, expense, loss, or damage incurred by any party relating to the information contained within the following report.

The investigation and research in this report has been carried out by experienced and conscientious professionals in the field to a standard of care expected in engineering practice. No other guarantee is given as to how accurate and comprehensive the information contained herein is.

Subterra's recommendations are based on our understanding of the current regulations and standards in New Zealand and are not legal opinions.

The recommendations of this report are based on our visual and physical investigation of the site. Some inference is made as to the lateral continuity of soils between the investigation points which cannot be guaranteed.

Contents

1 Introduction

1.1 Engagement

Subterra Ltd was engaged by Dave Luhrs on 17/09/2025 to undertake a geotechnical investigation and report for the property at 16-18 Kitchener Place, Opawa (Lot 15 DP 15075), henceforth referred to as 'the site'.

1.2 Proposed Development

It is proposed to develop the properties by constructing minor alterations and additions to the existing duplex dwelling. It is understood that two additional pad/pile footings are proposed within the footprint of the existing dwelling.

A preliminary concept plan provided by the client forms Appendix A.

1.3 Objective

The objective of this report is to describe ground conditions at the site and advise on foundation options for the proposed dwelling alterations and additions based on the geotechnical constraints.

1.4 Scope of Works

Subterra's investigation comprised the following scope of works:

- A brief desktop study to review geological mapping and geotechnical hazard resources available online.
- A site walkover along with photographic record.
- A shallow intrusive investigation comprising hand auger boreholes and Scala Penetrometer tests.
- A qualitative liquefaction assessment.
- Provision of an interpretive report summarising the above and providing geotechnical parameters for design of the proposed foundation elements.

This report assesses the land only, not the condition of any structures at the site.

This report is considered suitable to support a Building Consent application for the proposed internal additions to the existing dwelling, following a review of the finalised plans.

2 Site Description

2.1 Site Location

The site is irregular in shape and extends east from Kitchener Place and covering a total area of approximately 1,214m^2 (Figure 1).

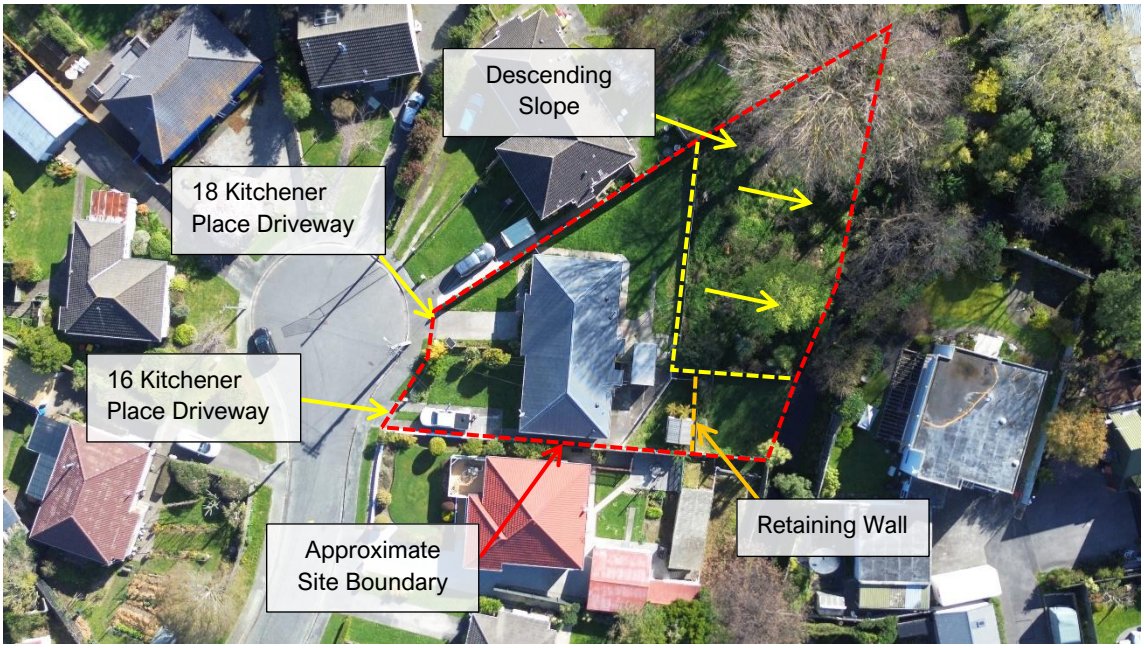


Figure 1: Site Aerial Photograph (taken from 120m altitude using Subterra's drone)

2.2 Site Walkover

The western half of the site is level ground and contains a single dwelling which has been converted into a duplex building. A few small trees and vegetation are present towards the western boundary (Figure 2, Figure 3).

A garage is present on the eastern side of the duplex which has been partitioned and can be accessed by each property (Figure 4). A garden shed is located on the southeastern side of 16 Kitchener Place.

A slope is located on the eastern half of the property which descends to the east. Trees have been planted along the slope at 18 Kitchener Place; no signs of erosion or slips were observed here either. At 16 Kitchener Place, the slope has been cut back and retained to create a relatively flat area.

Jackson's Creek runs in a northeast to southwest direction beyond the east boundary.

No ground damage was evident at the time of Subterra's visit (22/09/2025).

Figure 2 to Figure 7 show the site, taken during Subterra's site walkover:

Figure 2: View of 16 Kitchener Place from the entrance looking southeast

Figure 3: View of 18 Kitchener Place from the entrance looking southeast

Figure 4: View of the site from the middle of the southern boundary looking northeast

Figure 5: View of the site from the centre of the property looking southwest

Figure 6: View of the site from the middle of the northern boundary looking southwest

Figure 7: View of the site from centre of the property looking north

3 Desk-Based Information

3.1 Geological Mapping

According to the GNS Geological Unit QMap[1], the site is underlain by Holocene (<14,000-year-old) river deposits, comprising *'Unweathered, variably sorted gravel/sand/silt/clay.'*

3.2 Geological Investigation Data

Table 1 below is a summary of information from previous investigation holes within the local area, found on the New Zealand Geotechnical Database[2] (NZGD).

Hole Reference	Location from site	Depth begl	Summary
RC_13286	~45m SW 8 Kitchener Pl	19.95m	Topsoil to 0.5m Interbedded sand and silt to 18.9m Gravel to 19.05 Silt to at least 19.95m
HA_48642	~55m E 17 Tekapo Pl	3.7m	Topsoil to 0.5m Sandy Silt to at least 3.70m

Table 1: Nearby Geological Investigation Summary

3.3 Ground Water Data

NZGD borehole RC_13286 summarised in Table 1 above records groundwater level at 1.95m below ground level.

3.4 Site Subsoil Classification

Based on the geological mapping, the previous geological investigation data, and our experience in the area, Subterra considers that a seismic site subsoil classification 'Class D – Deep or soft soil sites', as defined in NZS:1170.5 is appropriate.

3.5 Qualitative Liquefaction Assessment

3.5.1 Christchurch Liquefaction Vulnerability Map

The Canterbury Maps Liquefaction Vulnerability Map[3] shows the site as being within an area where liquefaction damage is possible (High Liquefaction Vulnerability).

[1] Institute of Geological and Nuclear Sciences. (2024). *Geology QMap*. Retrieved September 2025 from https://data.gns.cri.nz/geology/

[2] Earthquake Commission. (2020). *New Zealand Geotechnical Database*. Retrieved September 2025 from https://www.nzgd.org.nz/

[3] Canterbury Maps. (2021). *Christchurch Liquefaction Viewer*. Retrieved September 2025 from https://apps.canterburymaps.govt.nz/ChristchurchLiquefactionViewer/

3.5.2 Christchurch Liquefaction Lab Study

The Canterbury Maps Liquefaction Lab shows that the site is in an area with a high likelihood of severe liquefaction damage. Using the modelling tool on the Liquefaction Lab site, under seismic shaking of 0.2g and 0.6g with magnitude 6 earthquake (M6) (assuming 2019 groundwater levels) the site is shown to have:

- 96% likelihood to have "*none to minor damage*" with 3% to have "*minor to moderate damage*" and 1% to have "*moderate to severe damage*" under M6 0.2g (equivalent to SLS design level), which implies a land performance consistent with TC1 land category under an SLS design event.
- 15% likelihood to have "*none to minor damage*" with 32% to have "*minor to moderate damage*" and 53% to have "*moderate to severe damage*" under M6 0.6g (>ULS design level). This implies a land performance is likely to be consistent with TC3 land category under a ULS design event.

4 Site Investigation

4.1 Scope of Investigation

In order to determine the ground conditions at the site, a shallow hand investigation comprising hand auger boreholes and Scala Penetrometer tests was considered sufficient for the scope of this project.

4.2 Shallow Hand Testing

Subterra visited the site on 22/09/2025 and carried out two hand auger boreholes with Scala Penetrometer testing. The results of Subterra's shallow investigation are attached on the Hand Auger Log Sheet which forms Appendix B.

The approximate locations of the test holes are given by Figure 8 below:

Figure 8: Approximate Test Locations

4.3 Summary of Subsoil Conditions

Subterra's site investigation indicated the following generalised soil profile beneath the tested area of the site:

Depth to base of unit (m begl)	Ground Description	Density / Consistency
0.4 to 0.6	TOPSOIL - Organic silt with some sand	-
1.6 to 2.0	SILT with trace sand	Firm to stiff
>2.3	SAND, variable silt	Loose to medium dense

Table 2: Generalised Ground Description

The hand auger refused due to saturated sand causing hole collapse at 2.3m begl.

4.4 Groundwater

Groundwater inflow was encountered at a depth of 2.2m begl in both test holes.

5 GEOTECHNICAL PROPERTIES

5.1 STATIC GEOTECHNICAL ULTIMATE BEARING CAPACITY (GUBC)

5.1.1 Scala Penetrometer

The Scala Penetrometer results have been analysed using the correlation between blow count and bearing capacity by Stockwell[4].

The blow count of the Scala Penetrometer indicated the following index Geotechnical Ultimate Bearing Capacities (GUBC's):

	SC101	SC102
Depth to 150kPa	0.5	0.6
Depth to 200kPa	0.9	0.6

Table 3: GUBC Depth Summary

Note that the topsoil depth beneath the dwelling footprint could vary from what was recorded in our test holes around the perimeter of the dwelling. As such, the available GUBC and depth to bearing stratum should be confirmed at the construction monitoring stage.

5.2 NZS 3604 'GOOD GROUND' ASSESSMENT

The NZS 3604:2011 definition of "Good Ground" is "*Any soil or rock capable of permanently withstanding an ultimate bearing capacity of 300kPa (i.e. an allowable bearing pressure of 100kPa using a factor of safety 3.0)*" It excludes expansive soils, topsoils/organic rich soils, uncompacted loose gravel and any ground likely to experience ground movements of 25mm or more.

The soils at the site **do not meet** the NZS 3604 definition of 'Good Ground' due to the potential for liquefaction and the low blow count of the Scala Penetrometer.

[4] Stockwell, M. (1977). Determination of allowable bearing pressure under small structures. *New Zealand Engineering. V32 I6*.

6 RECOMMENDATIONS

6.1 LIQUEFACTION DISCUSSION

While the site is classified as TC3, the proposed additions for the dwelling are to be located internally and only minimal in scale. As such, the seismic performance of the existing dwelling will not be worsened, only extended.

It is therefore our recommendation that any new foundations for the proposed additions are to match the type and embedment depth of the existing foundations as closely as is practical, rather than adhering to the MBIE TC3 foundation specifications.

The purpose of this recommendation is to reduce the likelihood of differential performance occurring between the existing and additional foundation elements.

6.2 FOUNDATION RECOMMENDATIONS

Based on the ground assessment, the following foundation types are considered appropriate to the ground conditions.

6.2.1 Concrete Pad or Pile Footings

The additional foundation elements will require specific engineering design (SED) for a reduced GUBC of 150kPa, which was encountered below the topsoil at depths of 0.5m and 0.6m begl.

A GUBC of 100kPa is considered too low to use for design as the soils would be prone to settlement under SLS and static loading.

The embedment depth and bearing capacity will require confirmation at the construction monitoring stage by a suitably experienced geotechnical professional familiar with the contents of this report, as the depth of topsoil could vary beneath the dwelling from what was encountered in our test holes around the perimeter.

If softer soils are encountered, the footing should be over-excavated and remediated with compacted gravel in accordance with NZS 4431 to achieve the design bearing capacity.

6.3 GENERAL

If gravel hardfill is required, it should be compacted in accordance with NZS 4431:2022 "*Engineered fill construction for lightweight structures*". Validation testing of the compacted gravel should be undertaken and signed off by a suitably experienced Geotechnical Engineer.

Advice from a geotechnical engineer should be sought if ground conditions different to those encountered in the intrusive investigation are observed during foundation construction works.

6.4 Construction Monitoring

The subgrade should be inspected by a suitably experienced geotechnical engineer familiar with the contents of this report to recommend any measure that may be necessary during the earthworks.

Should ground conditions which differ to those described in this report be encountered during the subgrade inspection, any soft, organic, fill, or otherwise unsuitable materials must be excavated and replaced with well-graded, compacted gravel.

Subterra would be pleased to carry out the inspection(s) and consider that this project would benefit from continuity. In any event, should the ground conditions differ from that inferred within this report, Subterra should be notified immediately so that we may review our assumptions and confirm that the design remains valid or provide alternative suitable solution.

A Building Consent must be obtained prior to building work commencing on site. Subterra will not inspect unconsented building work.

7 References

Canterbury Maps. (2021). *Christchurch Liquefaction Viewer*. Retrieved from https://apps.canterburymaps.govt.nz/ChristchurchLiquefactionViewer/

Earthquake Commission. (2020). *New Zealand Geotechnical Database*. Retrieved from https://www.nzgd.org.nz/

Historical Aerial Imagery. (2021). Retrieved from Canterbury Maps: https://apps.canterburymaps.govt.nz/CanterburyHistoricAerialImagery/

Institute of Geological and Nuclear Sciences. (2024). *Geology QMap*. Retrieved from https://data.gns.cri.nz/geology/

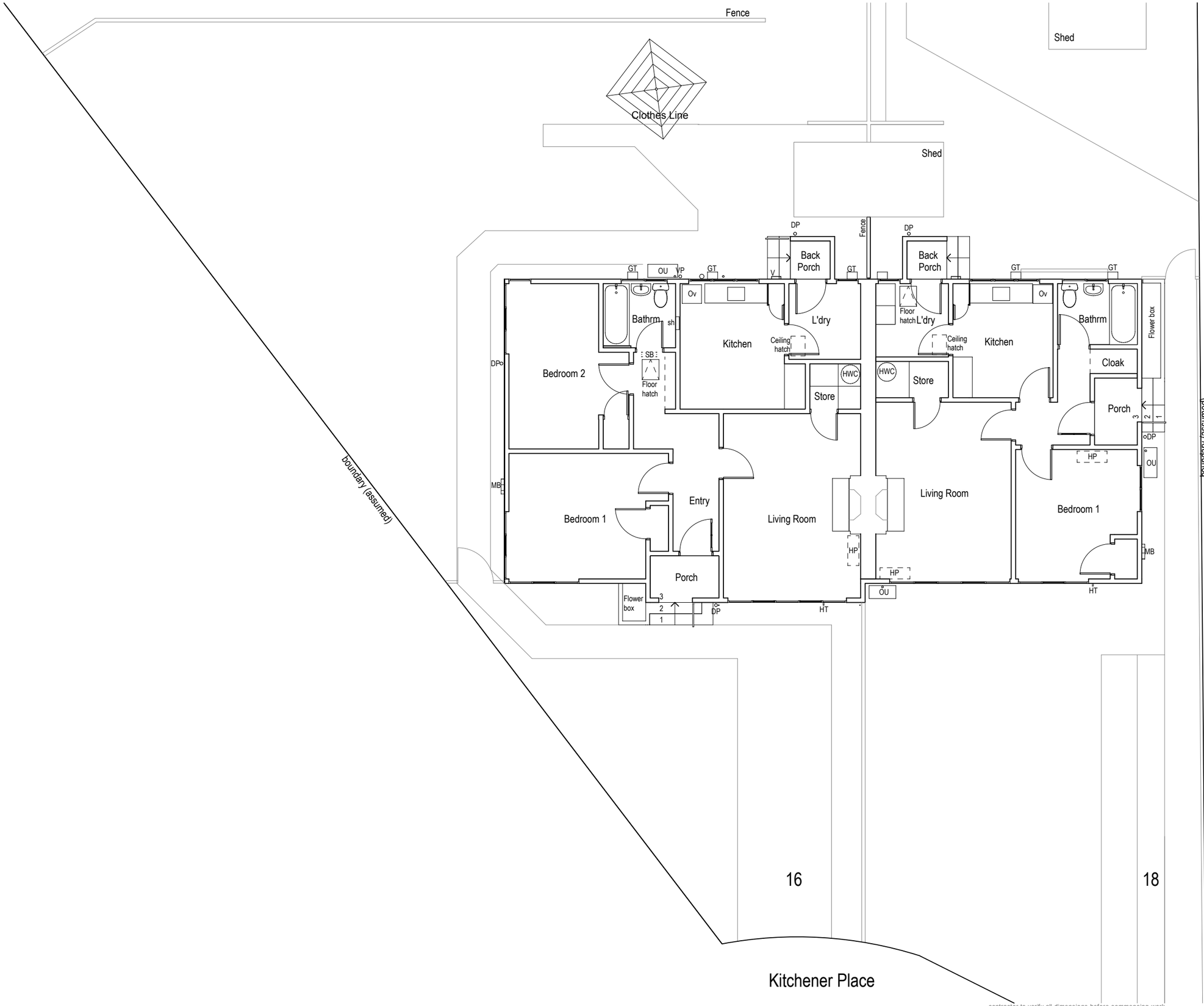
Listed Land Use Register. (2021). Retrieved from Environment Canterbury: https://llur.ecan.govt.nz/

Ministry of Business, Innovation, and Employment. (2015). *Repairing and rebuilding houses affected by the Canterbury earthquakes: Part C: Assessing, repairing and rebuilding foundations in TC3.*

Stockwell, M. (1977). Determination of allowable bearing pressure under small structures. *New Zealand Engineering. V32 I6*.

APPENDIX A

CONCEPT PLAN



Legend

SB	Switch board
SH	Shelf
HP	Heat Pump
OU	Out Door Unit
DP	Down Pipe
GT	Gully Trap
OV	Oven
VP	Vent Pipe

contractor to verify all dimensions before commencing work

16 and 18 Kitchener Place

Units Alterations

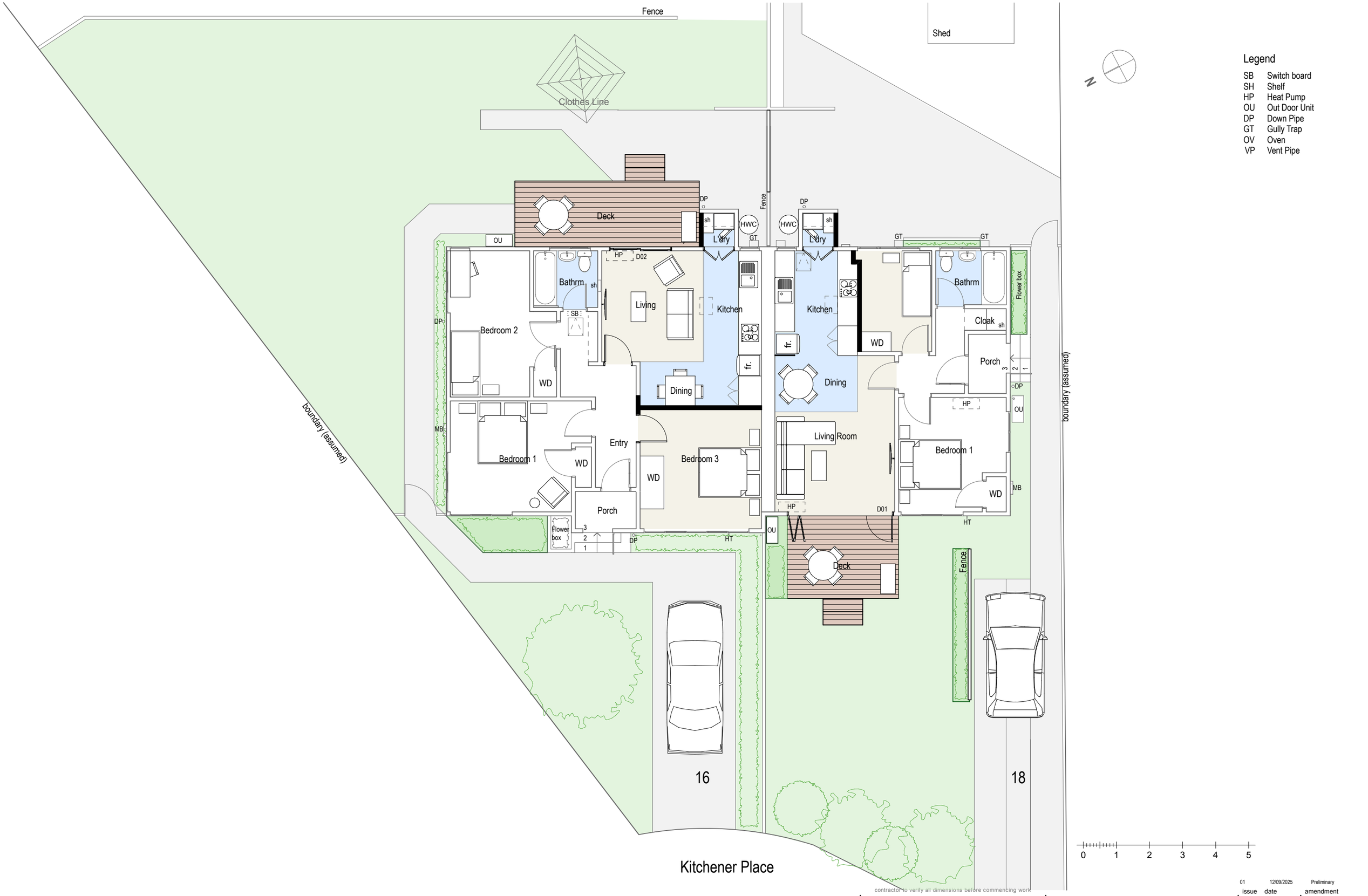
Floor Plan - Existing

WILKIE + BRUCE ARCHITECTS
Telephone 03 379 7739 156 Armagh St Christchurch
info@wilkieandbuce.co.nz PO Box 25-141 New Zealand

issue	date	amendment
01	12/09/2025	Preliminary

design: HP
date: Sep 25
drawn:
scale: 1:100 @A3
file: 5620

A1.1
rev: **01**



Legend

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contractor to verify all dimensions before commencing work

16 and 18 Kitchener Place

Units Alterations

Floor Plan - Proposed

WILKIE + BRUCE ARCHITECTS
Telephone 03 379 7739 156 Armagh St Christchurch
info@wilkieandbuce.co.nz PO Box 25-141 New Zealand

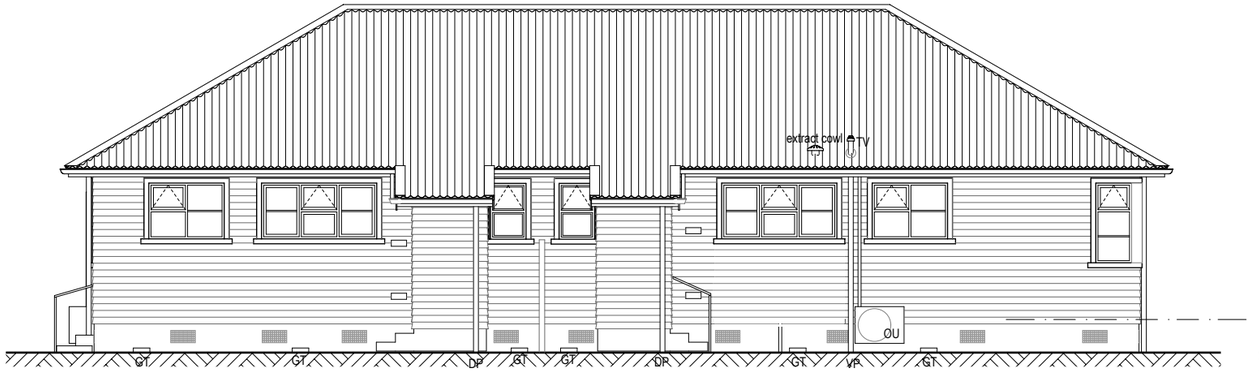
issue	date	amendment
01	12/09/2025	Preliminary

design: HP
date: Sep 25
drawn:
scale: 1:100 @A3
file: 5620

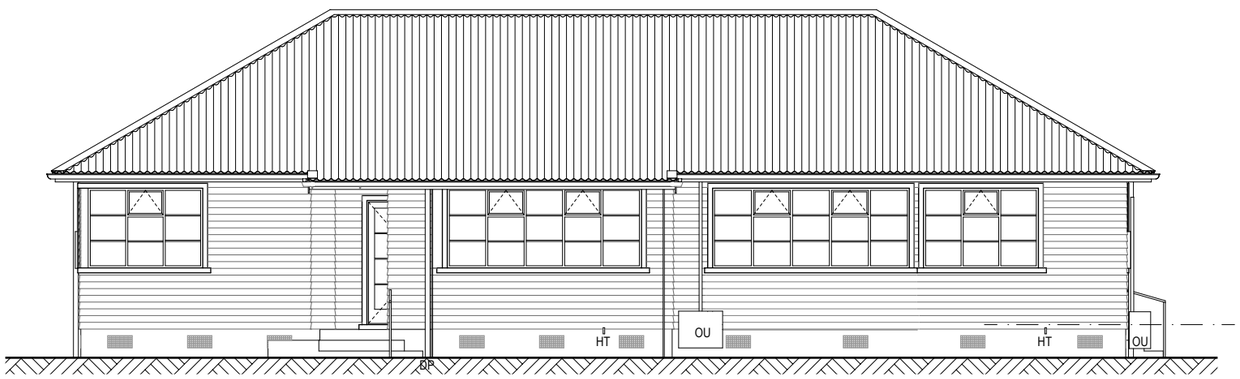
A1.2
rev: **01**

1 - North Elevation
1:100

3 - South Elevation
1:100



2 - East Elevation
1:100



4 - West Elevation
1:100

0 1 2 3 4 5

contractor to verify all dimensions before commencing work

16 and 18 Kitchener Place
Units Alterations

Elevation - Existing

WILKIE + BRUCE
ARCHITECTS
Telephone 03 379 7739 156 Armagh St Christchurch
info@wilkieandbuce.co.nz PO Box 25-141 New Zealand

issue	date	amendment
01	12/09/2025	Preliminary

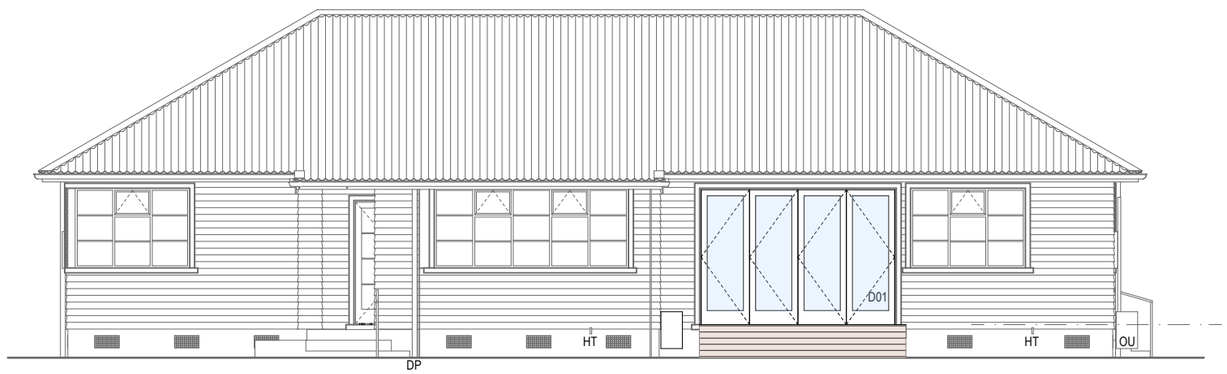
design: HP
date: Sep 25
drawn:
scale: 1:100 @A3
file: 5620

A2.1
rev: **01**

4 - North Elevation - Proposed
1:100

2 - South Elevation - Proposed
1:100

3 - East Elevation - Proposed
1:100



1 - West Elevation - Proposed
1:100

0 1 2 3 4 5

contractor to verify all dimensions before commencing work

issue	date	amendment
01	12/09/2025	Preliminary

16 and 18 Kitchener Place
Units Alterations

Elevations - Proposed

WILKIE + BRUCE ARCHITECTS
Telephone 03 379 7739 156 Armagh St Christchurch
info@wilkieandbuce.co.nz PO Box 25-141 New Zealand

design: HP
date: Sep 25
drawn:
scale: 1:100 @A3
file: 5620

A2.2
rev: **01**

APPENDIX B

HAND AUGER LOG SHEETS

SUBTERRA
Geotechnical Investigation

SITE PLAN

JOB NO.: 2025-0681

CLIENT:	Dave Luhrs
PROJECT:	Geotechnical Investigation
LOCATION:	16-18 Kitchener Place, Opawa

INVESTIGATION LOG

SUBTERRA Geotechnical Investigation

HOLE NO.: HASC101

CLIENT: Dave Luhrs
PROJECT: Geotechnical Investigation
JOB NO.: 2025-0681

SITE LOCATION: 16-18 Kitchener Place, Opawa
START DATE: 22/09/2025
CO-ORDINATES:
ELEVATION: Ground
END DATE: 22/09/2025
CONTRACTOR:
RIG:
DRILLER:
LOGGED BY: BD

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 100mm)	HAND SHEAR VANE (Uncorrected)	WATER
TOPSOIL - dark brown, organic silt with trace fine sand, moist.		0.0	TS	1, 2, 2, 2		
Firm, light greyish brown mottled orangish brown, SILT with trace fine sand and trace clay, no plasticity, moist.		0.4		1, 1, 2, 2		
Becomes mottled grey.		0.8		1, 2, 2, 2, 2		
Becomes minor fine to medium sand and moist to wet.		1.2		3, 2, 2		
Becomes wet.		1.6		2, 2, 2		
Loose to medium dense, brownish grey mottled orangish brown, silty fine to coarse SAND, wet to saturated.		1.8		3, 3, 2		
Becomes some silt.		2.2		3, 4		
Becomes saturated.		2.4		3, 3, 4		
End of borehole - Unable to retrieve sample due to saturated sand. EOH: 2.90m		2.8		4, 5		
		3.0				Saturated soils encountered from 2.2m begl

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INVESTIGATION LOG

SUBTERRA Geotechnical Investigation

HOLE NO.: HASC102

CLIENT: Dave Luhrs
PROJECT: Geotechnical Investigation

JOB NO.: 2025-0681

SITE LOCATION: 16-18 Kitchener Place, Opawa
START DATE: 22/09/2025
CO-ORDINATES:
ELEVATION: Ground
END DATE: 22/09/2025
CONTRACTOR:
RIG:
DRILLER:
LOGGED BY: BD

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 100mm)	HAND SHEAR VANE (Uncorrected)	WATER
TOPSOIL - dark brown, organic silt with trace fine sand, moist.		0.0	TS	1, 1, 1, 1		
Firm to stiff, light greyish brown mottled orangish brown, SILT with trace fine sand and trace clay, no plasticity, moist.		0.6		2, 2, 6, 2, 2		
Becomes minor fine to medium sand, moist to wet.		1.2		4, 3, 2, 3, 2		
Becomes wet.		1.6		3, 4, 5, 4		
Loose to medium dense, brownish grey mottled orangish brown, silty fine to coarse SAND, wet to saturated.		2.0		4, 4		
Becomes saturated.		2.2		5		
End of borehole - Unable to retrieve sample due to saturated sand. EOH: 2.90m		2.4		5, 5, 4, 5, 5, 7		
		3.0				Saturated soils encountered from 2.2m begl

Generated with CORE-GS by Geroc - Hand Auger - scala bar - 22/09/2025 11:57:19 am

B1 SED

PRODUCER STATEMENT – PS1
DESIGN

Building Code Clause(s):	B1,	Job number: 220142
ISSUED BY: *(Engineering Design Firm)*	Structural Design Studio Ltd (t/a Moment)	
TO: *(Client)*	White Sparrow Homes Ltd	
TO BE SUPPLIED TO: *(Building Consent Authority)*	Christchurch City Council	
IN RESPECT OF: *(Description of building work))*	Alterations to an existing structure	
AT: *(Address)*	16&18 Kitchener Place, Opawa, Christchurch 8023	
LEGAL DESCRIPTION	Lot 15 DP 15075	

We have been engaged by White Sparrow Homes Ltd to provide:

SED Bracing, SED Foundations, SED Beams, SED Posts,

in respect of the requirements of the Clause(s) of the Building Code specified above for all of the proposed building work.

In this document SED means “Specific Engineering Design”.

The design carried out by Structural Design Studio Ltd (t/a Moment) has been prepared in accordance with:

✓ compliance documents issued by the Ministry of Business, Innovation & Employment (Verification method /acceptable solution): B1/VM1

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

On behalf of Structural Design Studio Ltd (t/a Moment), and subject to:

- site verification of the following design assumptions:
  - Ultimate ground bearing capacity to exceed 150kPa and to be confirmed on site by Subterra (Geotechnical Engineer)
- 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 attached Schedule, will comply with the relevant provisions of the Building Code specified above; and that
- the persons who have undertaken the design have the necessary competence to do so.

I recommend the CM3 level of construction monitoring.

I, Wayne Phillips, am:

- CPEng number 239990
- and hold the following qualifications: B.E. (Hons)

Structural Design Studio Ltd (t/a Moment) holds a current policy of Professional Indemnity Insurance no less than $200,000.

✓ Structural Design Studio Ltd (t/a Moment) is a member of ACE New Zealand.

SIGNED BY: Wayne Phillips

(Signature): W R Phillips Date: 16 October 2025

ON BEHALF OF: Structural Design Studio Ltd (t/a Moment)

Note: This statement has been prepared solely for Christchurch City Council and shall not be relied upon by any other person or entity. Any liability in relation to this statement accrues to Structural Design Studio Ltd (t/a Moment) only. As a condition of reliance on this statement, Christchurch City Council accepts that the total maximum amount of liability of any kind arising from this statement and all other statements provided to Christchurch City Council 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:

- Certificate of Design Work, Construction Monitoring Schedule, B2 Letter in Lieu - Design
- Engineering Drawing Set: 220142 DRG S C2 - 16&18 Kitchener Place
- Refer drawing register
- Engineering Calculations: 220142 CALC 01 S C1 - 16&18 Kitchener Place
- Geotechnical Report: Subterra Geotechnical Report for Proposed Additions - 16&18 Kitchener Place 2025.09.25

GUIDANCE ON USE OF PRODUCER STATEMENTS

Information on the use of Producer Statements and Construction Monitoring Guidelines can be found on either the **ACE New Zealand** or **Engineering New Zealand** websites.

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 20112
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 engineers3).
The BCA 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

BCAs 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. No design professional should be expected to provide a producer statement unless such a requirement forms part of Structural Design Studio Ltd (t/a Moment)'s engagement.

Refer Also:

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

www.acenz.org.nz
www.engineeringnz.org

CONSTRUCTION MONITORING SCHEDULE

SCHEDULE OF MONITORING FOR

Address: 16&18 Kitchener Place, Opawa, Christchurch 8023

Job number: 220142

We propose that at least the following site monitoring is undertaken to Engineering New Zealand/ACENZ CM3:

No.	Item of monitoring	Timeframe	To be monitored by
1.	Internal beams and connections	While all connections are clearly visible, pre-line and prior to building in to such an extent that remediation work could not be carried out.	Engineer
2.	Bracing walls	Pre & post-lining	Engineer
3.	Foundation subgrade	Prior to placing hardfill, sand or concrete blinding layer	Geotechnical Engineer

Notes:

a) The above items of monitoring are the minimum required to enable Structural Design Studio Ltd (t/a Moment) to issue a PS4 – Producer Statement Construction Review for the specific engineering design items.

b) The above items of monitoring do not cover work constructed in accordance with NZS 3604:2011, for which monitoring is to be undertaken by the Building Consent Authority.

c) The Contractor/Builder is to provide Structural Design Studio Ltd (t/a Moment) at least 24 hours' notice of the requirement for monitoring. The above timeframes are indicative, the Engineer and Contractor are to agree the timing of monitoring prior to work commencing on site.

d) A copy of this monitoring schedule is to be held on site during the works, and the Contractor/Builder is to provide reasonable and safe access to enable works to be monitored according to the schedule.

e) The above schedule does not necessarily represent the actual number of monitorings to be undertaken. The number of monitorings will depend on the construction method, sequence of the works and whether or not unforeseen conditions or difficulties are encountered on site.

CERTIFICATE OF DESIGN WORK MEMORANDUM FROM LICENSED BUILDING PRACTITIONER

SECTION 30C AND SECTION 45, BUILDING ACT 2004

THE BUILDING			
Street Address	16&18 Kitchener Place		
Suburb	Opawa	**Town/City**	Christchurch
Postcode	8023		

THE OWNER			
Name(s)	White Sparrow Homes Ltd		
Email	dave.luhrs@ifindproperty.co.nz	**Phone**	+64 21 153 0843
Address	16&18 Kitchener Place, Opawa, Christchurch 8023		

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 PS1.

IDENTIFICATION OF RESTRICTED BUILDING WORK (RBW) DESIGN WORK

I, Wayne Phillips 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	✓	SED Foundations as per foundation plan	Carried out
Subfloor framing	✓	Timber blocking and floor strengthening	Carried out
Retaining walls	✗	Not applicable	Not applicable
Beams	✓	SED beams and posts as per proposed floor plan	Carried out
Portal	✗	Not applicable	Not applicable

Bracing	✓	Bracing as per bracing plan.	Carried out
Other (primary)	✗	Not applicable	Not applicable

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

WAIVERS AND MODIFICATIONS

Are waivers or modifications of the Building Code required? No

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

ISSUED BY

Name	Wayne Phillips	**Design entity/company**	Structural Design Studio Ltd (t/a Moment)
Chartered status	Chartered Professional Engineer	**Chartered no.**	239990
Email	wayne@moment.net.nz	**Website**	https://www.moment.net.nz/
Phone (daytime)	0276507073	**Phone (after hours)**	0276507073
Mobile	0276507073		
Postal address	Ground Floor, 190 St Asaph Street, Christchurch		
Physical address	Ground Floor, 190 St Asaph Street, Christchurch		

DECLARATION

I, Wayne Phillips, 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
- ~~complies with the Building Code subject to any waiver or modification of the Building Code described in this memorandum.~~

Signature WRPhillips Date 16 October 2025

LETTER IN LIEU – DESIGN

To the Building Official,
Christchurch City Council
Alterations to an existing structure at 16&18 Kitchener Place, Opawa, Christchurch 8023

COMPLIANCE WITH BUILDING CODE CLAUSE B2 – DURABILITY

The purpose of this letter is to demonstrate how compliance with Clause B2 (Durability) of the Building Code will be achieved for the above project. We can confirm that for specifically designed structural elements that are included within our design documentation:

Material	Means of Compliance	Details
Structural timber	B2/AS1	Timber treatment has been selected in accordance with Table 1A of B2/AS1

Yours faithfully,

WR Phillips 16 October 2025

Wayne Phillips

For and on behalf of

Structural Design Studio Ltd (t/a Moment)

Moment
www.moment.net.nz

16 & 18 Kitchener Place
Opawa,
Christchurch

Job number.	220142
Revision:	C1
Status:	Consent/Construction
Date:	September 2025

Contents

1.0 Description of Proposed Structural Works

These calculations cover the design of a new ceiling/roof beam and bracing check to facilitate the removal of existing load bearing and bracing walls separating the kitchen and living room areas at two adjoined properties: 16&18 Kitchener Place, Christchurch.

The structural scope is:

a) Design of new beam and load transfer system to foundation level
b) Bracing plan
c) Design of new pad foundation to resist beam end reactions

At 16 Kitchener Place, the new beam design allows for a maximum span of 2.7m, with a tributary width of 4 m (half the building width). At 18 Kitchener Place, the new beam design spans 3.8 m, with a corresponding tributary width of 4.3 m.

2.0 Description of Existing Structure

The property at 16 & 18 Kitchener Place, Opawa, Christchurch, consists of two adjoined single-storey dwellings built in the 1940s.

The existing property is of timber framed construction, with timber rafter and underpurlin roofing cladded with lightweight steel roof sheeting. The foundation system consists of a shallow concrete perimeter footing with internal piles supporting timber bearers and joists.

Lateral load resistance is provided by the timber-framed walls in both principal directions. A concrete blockwork wall separates the two units, serving as both a sound and fire barrier.

The property is classified in Technical Category TC3, Blue by MBIE. Land is this zone is generally suitable to houses to be repaired or rebuilt. New foundations would be site specific and may involve deep foundation piles.

Figure 1: Site Plan illustrating the locations of 16 Kitchener Place (Blue) and 18 Kitchener Place (Purple

3.0 Design Standards and Criteria

3.1 Structural Design Standards

The design of the structural elements for the proposed works has been carried out to satisfy the requirements of the New Zealand Standards listed below.

- AS/NZS1170 Structural Design Actions
- NZS3603 Timber Structures Standard
- NZS3101 Concrete Structures Standard
- NZS3404 Steel Structures Standard

All to include revisions and amendments to date of site start.

3.2 Serviceability Design Criteria

The beam has been designed to achieve an L/360 deflection criterion for short and long-term load cases.

4.0 Building Records

4.1 Site Photos

Moment engineers Wayne Phillips and Charlotte Walker carried out a non-invasive inspection of the interior and exterior of the dwelling on 19 September 2025.

Figure 2: Front (west) elevation of 16&18 Kitchener Place, Opawa, Christchurch.

Figure 3: North-east elevation of property, facing the rear corner of 18 Kitchener Place.

Figure 4: Internal wall within the living room of 16 Kitchener Place to be removed.

Figure 5: The kitchen-facing side of the internal wall within 16 Kitchener Place to be removed.

Figure 6: View of the roof structure at 16 Kitchener Place.

Figure 7: View of the foundation system at 16 Kitchener Place.

Figure 8: Internal wall within the living room of 18 Kitchener Place to be removed.

Figure 9: The kitchen-facing side of the internal wall within 18 Kitchener Place to be removed.

Figure 20: View of the foundation system within 18 Kitchener Place.

4.1 Existing Plans

Original drawings were provided to Moment prior to the inspection.

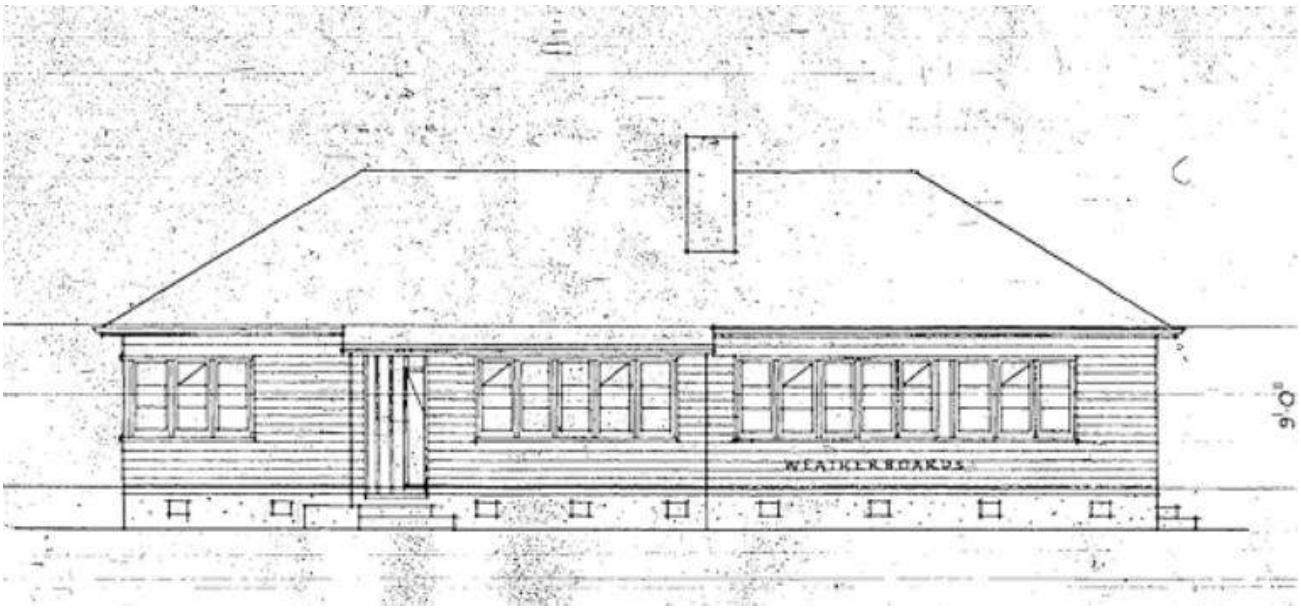


Figure 11: Front (west) elevation

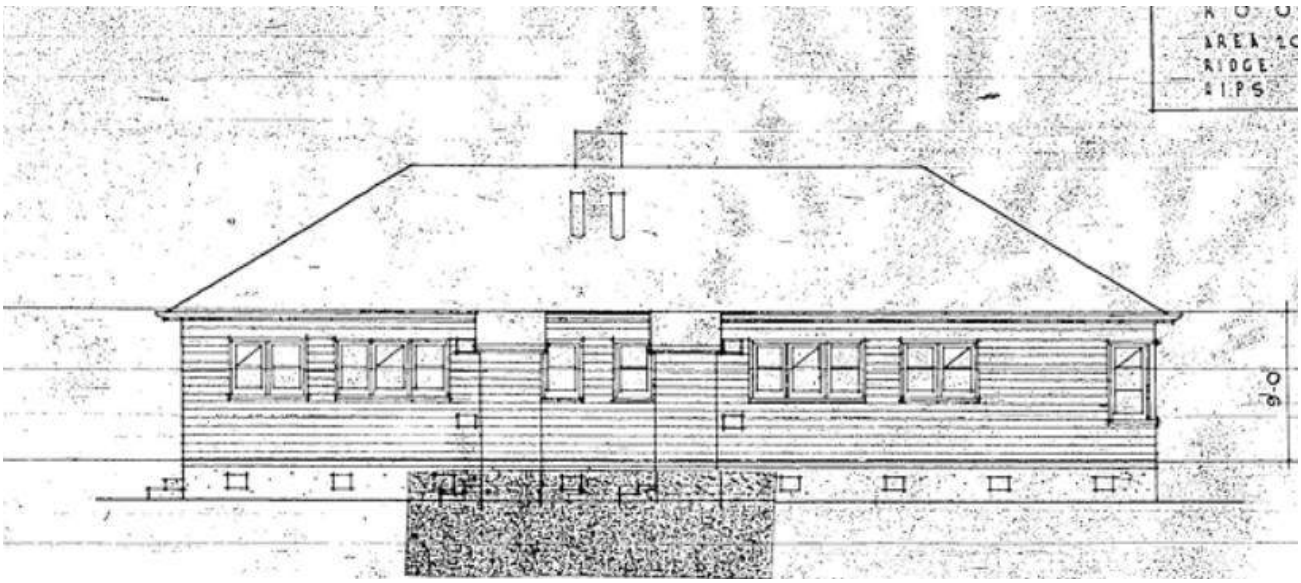


Figure 12: Rear (east) elevation

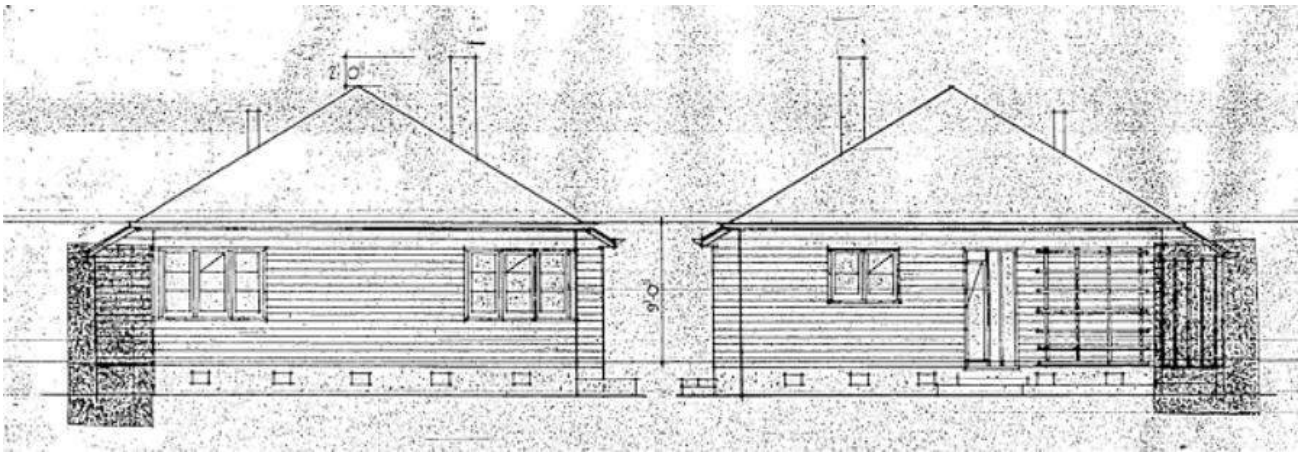


Figure 13: North elevation (left) and south elevation (right).

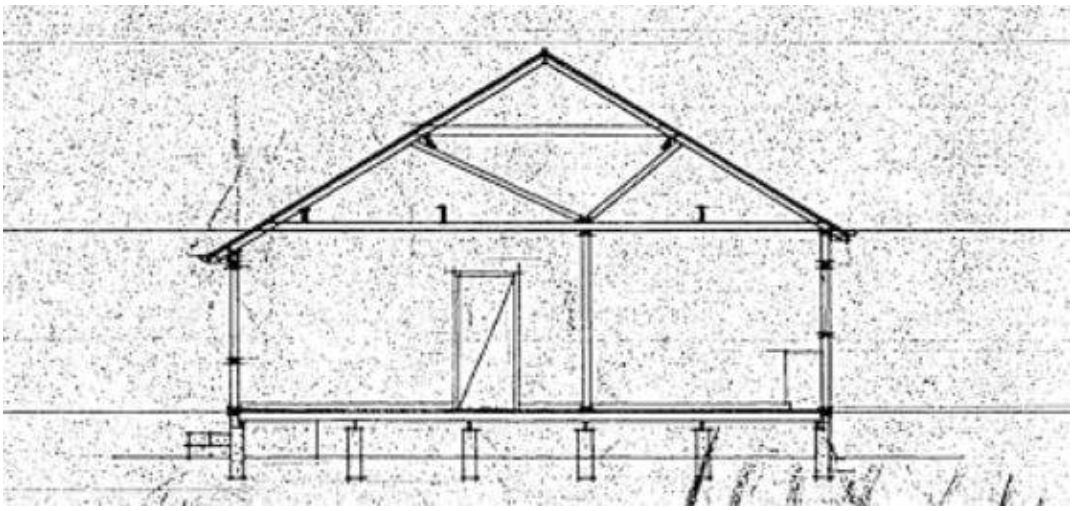


Figure 14: Internal wall elevation.

5.0 Structural Calculations

Loadings

Site loads calculated as follows. Wind loads are found using Checkwind software.

Specific beam design loads can be found in the beam design section.

Client:		Date: Sep 2025	
Project/Job: 16&18 Kitchener Place		Job No: 220142	
Subject: Site Loadings - House		Sheet:	By: CW

GENERAL DESIGN PARAMETERS

Loadings to AS/NZS 1170 series of standards

Site & Building Information

Location	Christchurch	
Wind Region	Using Checkwind	
Snow Region	N4	*Figure 2.2 (NZS1170.3:2003)*
Building Importance Level	2	
Design Working Life	50 years	
Altitude	11 m	*Found using NZ Topo*
Roof Pitch	30	*From architectural drawings*

Return Period

Ultimate Limit State		*Table 3.3 (NZS1170.0:2004)*
Seismic	500	
Wind	500	
Snow	150	
Servicability limit State		*Table 3.3 (NZS1170.0:2004)*
SLS_1	25	
SLS_2 (Seismic only)	-	

Client:		Date: Sep 2025	
Project/Job: 16&18 Kitchener Place		Job No: 220142	
Subject: Site Loadings - House		Sheet:	By: CW

SNOW LOADS

NZS1170.3:2003

Building Information Summary

Altitude	h_0 =	11	m
Roof Pitch	α =	30	°

Site Exposure Multipliers

Snow Regions

Snow Region		N4
Terrain Category		*Sub-alpine*
Exposure		*Sub-alpine*

Snow Actions

Exposure Reduction Coefficient		1.0	*Sub-alpine*

Ground Snow Load

Probability Factor	$k_{p,ULS}$ =	1.25	*Table 5.1*
	$k_{p,SLS}$ =	0.85	
Characteristic Ground Snow Load	$S_{g,ULS}$ =	0.90	*Minimum of 0.9 kPa for regions N4*
	$S_{g,SLS}$ =	0.34	*and N5 at ULS, as required by B1*

Roof Snow Load

Shape Coefficient	μ_1 =	0.42		
Ultimate Limit State	S_{uls} =	0.38	kPa	$= S_g\ C_e\ \mu_1$
Serviceability Limit State	S_{sls} =	0.14	kPa	
Ratio SLS/ULS	sls/uls=	0.38		

Note: Balanced, unobstructed conditions only

SEISMIC LOADS

NZS1170.5:2004

Site Hazard Spectra

Site subsoil class		D	*Assumption - typical for Christchurch*
Hazard factor		0.3	*Christchurch*
Return period factors	$R_{,ULS}$ =	1.0	*Table 3.5*
	$R_{,SLS1}$ =	0.25	
	$R_{,SLS2}$ =	-	
	ZR_u =	0.3	
Major fault distance	D =	> 20 km	
Near fault factor	$N(T,D)_{ULS}$ =	1.0	

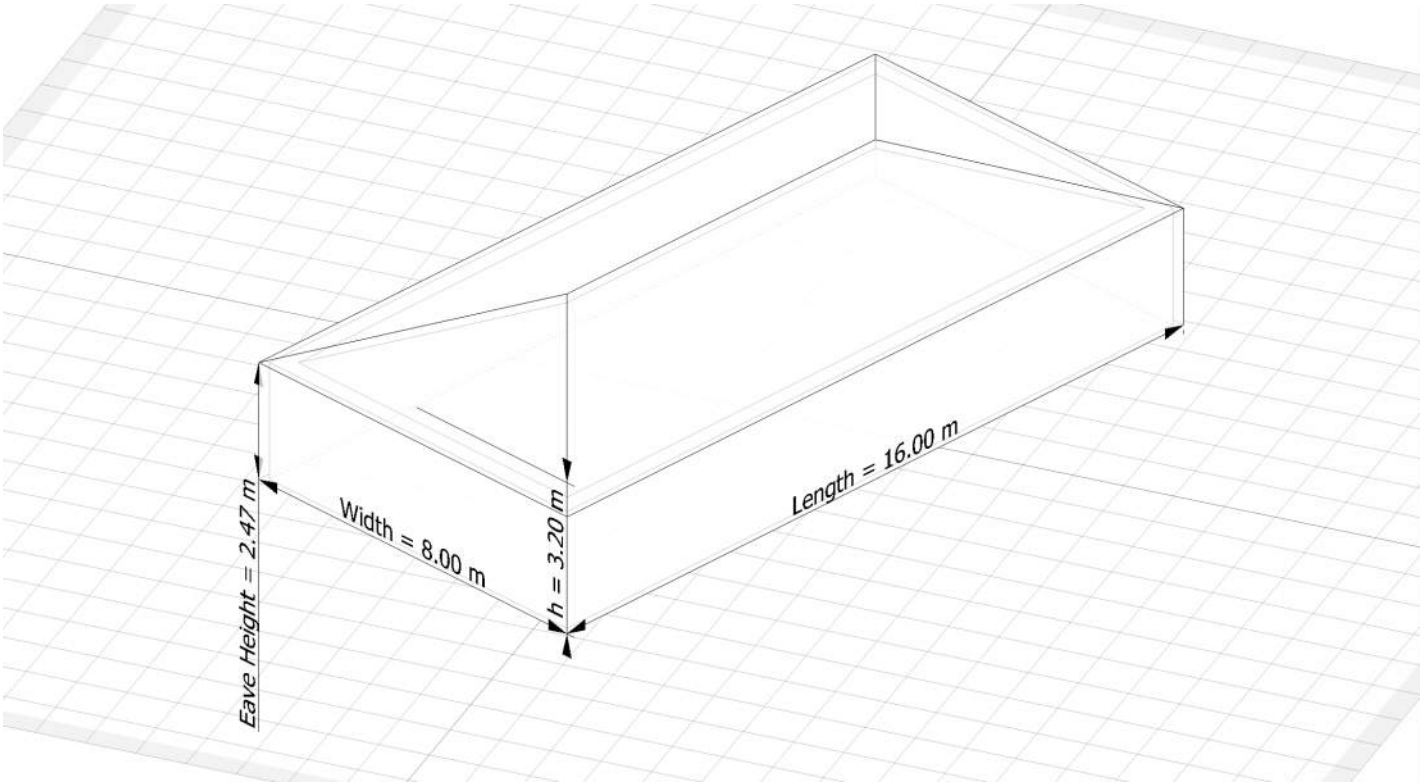
Elastic Site Hazard Spectra

	X direction	*Y direction*	
Period	0.4 s	0.4 s	
Spectral shape factor	3.00	3.00	
Elastic site hazard spectra	0.90 g	0.90 g	*Cd(T1) = Cg(T) Z R N(T,D)*

CHECKWIND AS/NZS 1170.2-2021 SITE REPORT

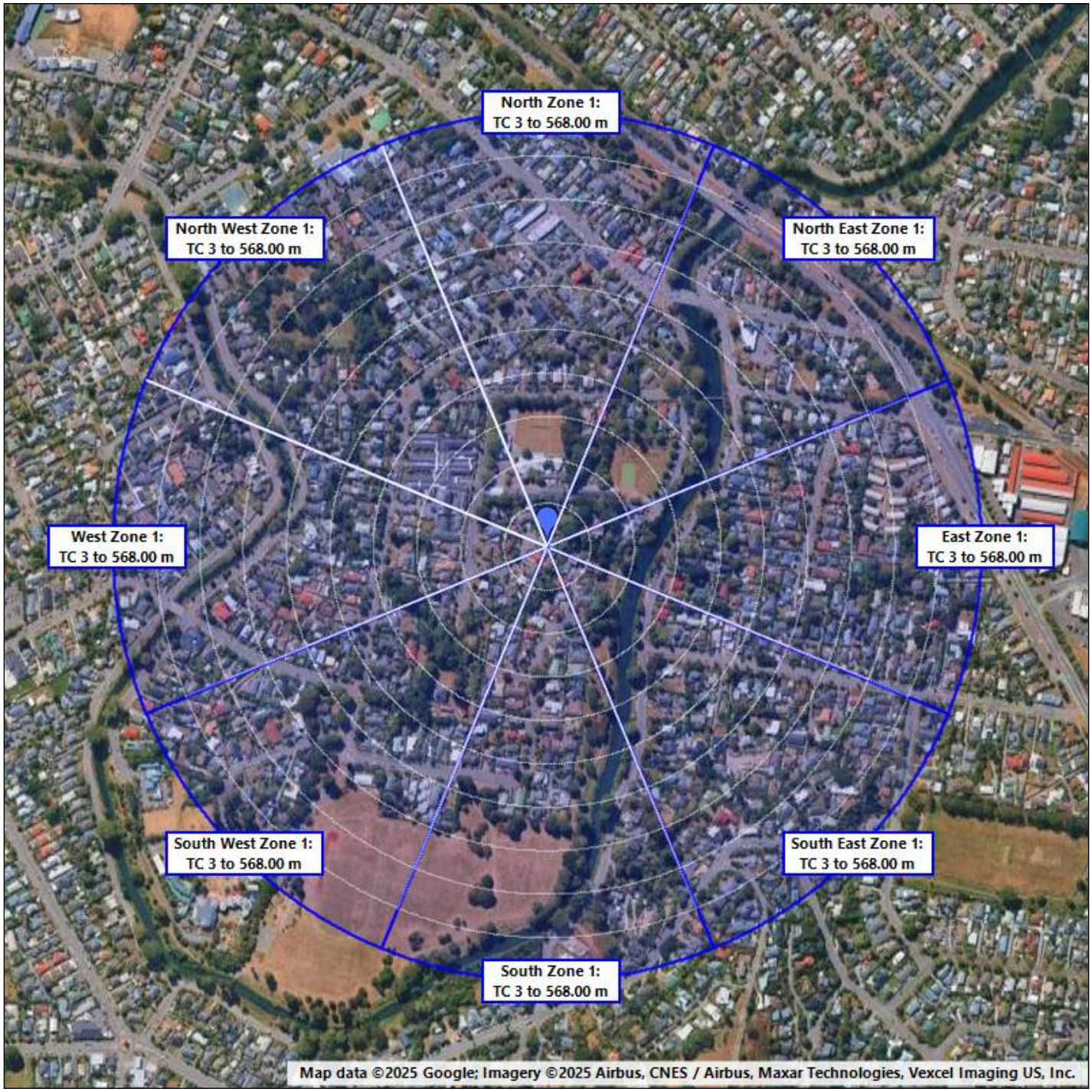
revolutic

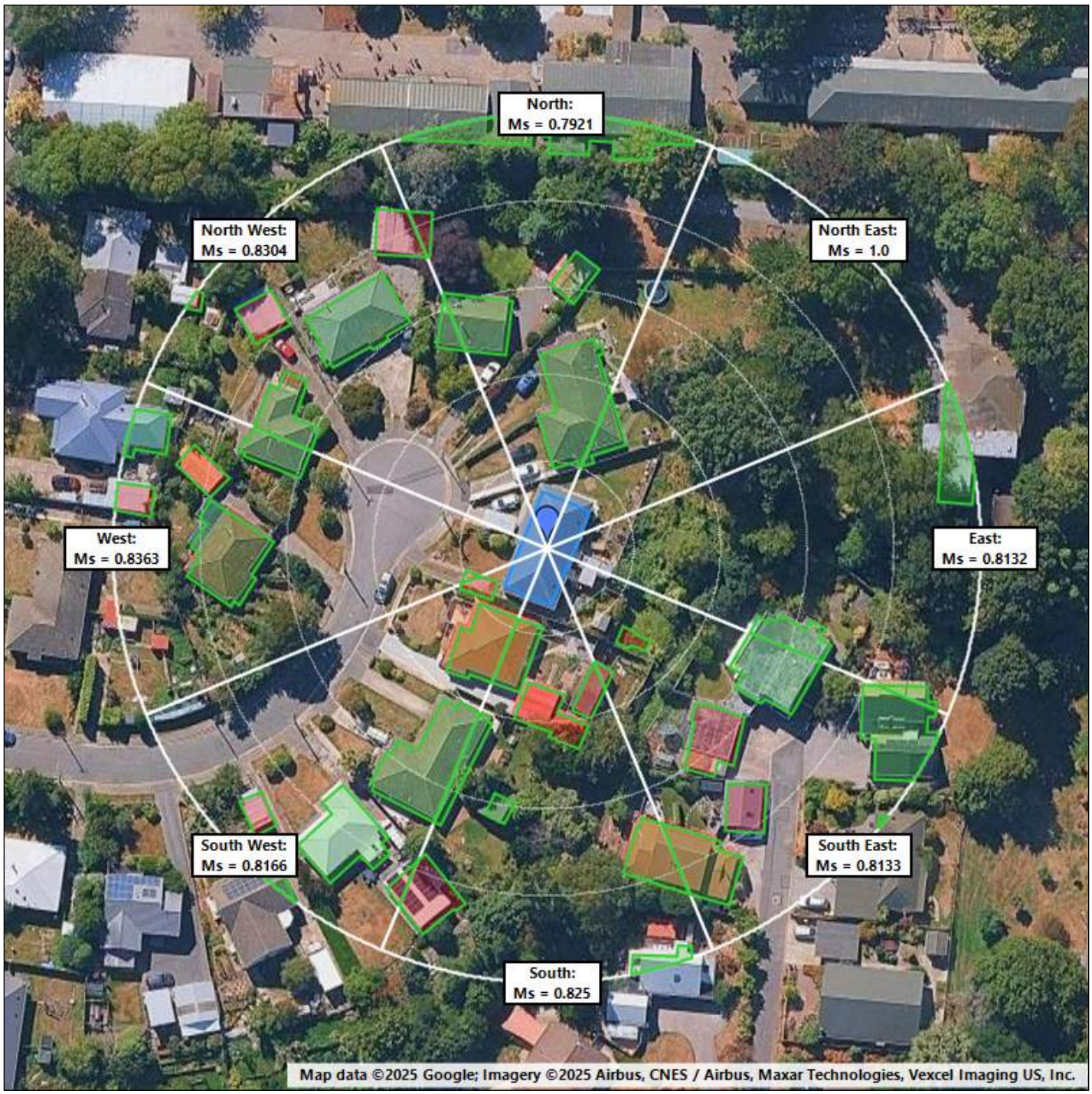
STRUCTURE:	HOUSE	LATITUDE:	-43.556961	CRITICAL DIRECTION:	North East
ORIENTATION:	22.5°	LONGITUDE:	172.664354	Md:	0.9
WIDTH:	8.00 m	ELEVATION:	4.50 m	Mc:	1.0
LENGTH:	16.00 m			TC:	3.0
HEIGHT (h):	3.20 m	WIND		Mz,cat:	0.83
BASE RL:	0.00 m	REGION:	NZ2	Ms:	1.0
		ULTIMATE ARI:	500 YEARS	Mh:	1.0
IMPORTANCE LEVEL:	2	ULTIMATE VR:	45 m/s	Mlee:	1.0
DESIGN LIFE:	50 YEARS	SERVICEABILITY VR:	39 m/s	Mel:	1.0
				Mt:	1.0
		SNOW		Vsit,β:	33.62 m/s
		REGION:	N4	qsit,β:	0.6782 kPa
		ELEVATION CLASS:	SubAlpine	Vserv,β:	29.13 m/s
				qserv,β:	0.5091 kPa
		SEISMIC			
		RISK COEFFICIENT:	0.3		



TITLE:
PROJECT:
CODE:

CHECKWIND 8.3.3
Tuesday, September 23, 2025 6:27:44 PM
Wayne Phillips @ Moment


North Zone 1:
TC 3 to 568.00 m
North West Zone 1:
TC 3 to 568.00 m
North East Zone 1:
TC 3 to 568.00 m
West Zone 1:
TC 3 to 568.00 m
East Zone 1:
TC 3 to 568.00 m
South West Zone 1:
TC 3 to 568.00 m
South East Zone 1:
TC 3 to 568.00 m
South Zone 1:
TC 3 to 568.00 m
Map data ©2025 Google; Imagery ©2025 Airbus, CNES / Airbus, Maxar Technologies, Vexcel Imaging US, Inc.



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PROJECT:
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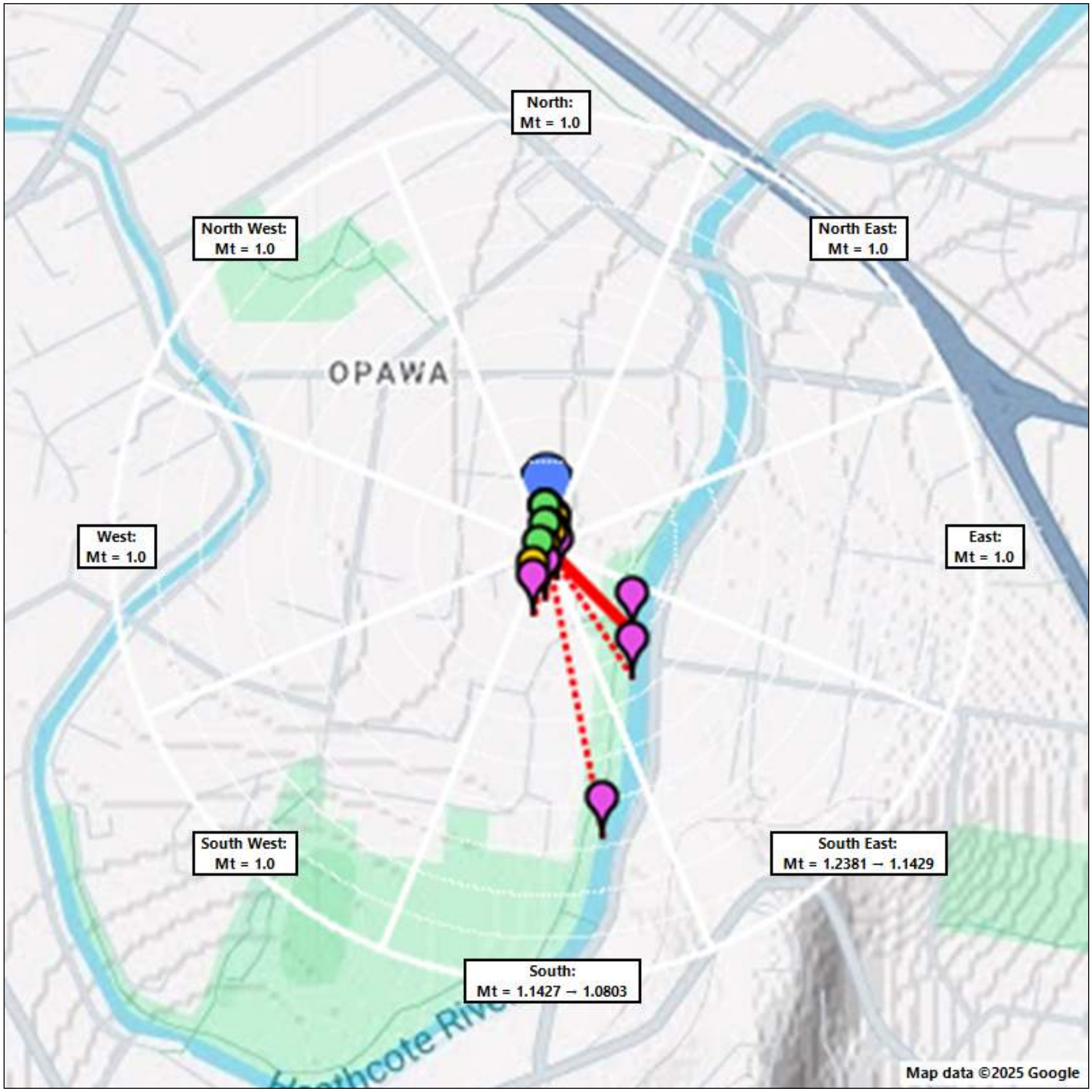
Tuesday, September 23, 2025 6:27:44 PM
Wayne Phillips @ Moment



TITLE:
PROJECT:
CODE:

CHECKWIND 8.3.3
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Wayne Phillips @ Moment

Beam Design

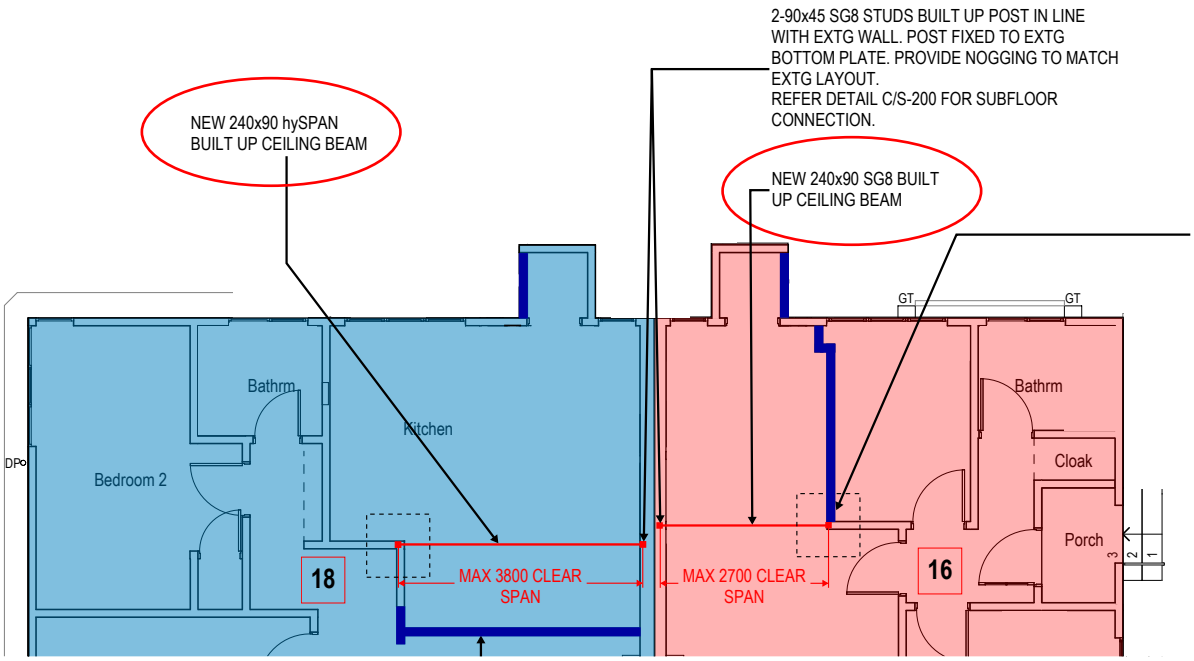
The roof is light steel sheeting on timber rafters which span from a ridge beam to the eave, with intermediate support on a timber underpurlin. All of the roof structure is strutted onto the internal timber walls within the properties.

Where existing load bearing walls are to be removed, new timber beams are to be installed to resupport the roof.

The existing roof is to be propped, with the struts reconfigured to transfer load onto the new beams. The existing ceiling structure is also to be supported on the new beam, and the ceiling runners and battens are to be supported via new joists hangers.

At 16 Kitchener Place, the new beam is calculated to be a 240x90 SG8 built up ceiling beam which allows for a maximum span of 2.7m. At 18 Kitchener Place, the new beam is a 240x90 hySPAN built up ceiling beam spanning 3.8 m.

The new ceiling beam at 16 Kitchener Place is a 240x90 SG8 built-up section, designed to span up to 2.7 m. The beam at 18 Kitchener Place is a 240x90 hySPAN built-up section spanning 3.8 m.



Client:		Date: Sep 2025	
Project/Job: 16 Kitchener Place		Job No: 220142	
Subject: Ceiling beam		Sheet:	By: CW

LOADS: **REFERENCE:** **Ceiling beam**

Gravity Loads

Calculate dead and selfweight loads acting on the beam

Distributed Load

Item	Value
Roof	0.35 kPa
Ceiling	0.10 kPa
Wall	kPa
Other	kPa
Self *(trib w. as below & Y = 5 kN/m³)*	0.03 kPa
Total	0.48 kPa

Point Load (ie beam reaction)

Puls = 0 kN

Psls = 0 kN

Lower bound distributed gravity

Roof	0.45 kPa
Other	0.00 kPa
Total	0.45 kPa

Live Load

Calculate live loads acting on the beam

Direct Load

Point live load Qp = 1.10 kN

Distributed live load Qudl = 0.25 kPa

SLS CombinationFactor ψl = 0.7

Note: the live point and distributed loads per NZS1170.1 are considered seperately for the wrost case effects on each of M, V & Δ off

Point Load (ie beam reaction)

Puls = 0 kN

Psls = 0 kN

Point loads are intended to represent for example the reaction of another beam landing on this beam being designed.

Snow Load

Calculate snow loads acting on the beam

Distributed Load

Design snow load, ULS Sg,u = 0.38 kPa

SLS/ULS 0.37

Design snow load, SLS Sg,s = 0.14 kPa

Point Load (ie beam reaction)

Puls = 0 kN

Psls = 0 kN

Seismic Load

Calculate seismic loads acting on the beam

Tributary seismic mass E = 0.00 kPa

Seismic Coefficient Cp(t) = 0.00 g

SLS/ULS 0.00

ULS 0.00 kPa

SLS 0.00 kPa

Point Load (ie beam reaction)

Puls = 0 kN

Psls = 0 kN

Wind Load

Calculate wind loads acting on the beam

Site wind ULS Vsite = 34 m/s

Psite = 0.69 kPa

sls/uls 0.75

		External pressures Downward	External pressures Upward	Internal Pressures Downward (-ve)	Internal Pressures Upward (+ve)
Shape	Cpe	0.0	-0.6	-0.2	0.2
Area	Ka	1.0	1.0	1.0	1.0
Local	Kl	1.0	1.0	1.0	1.0
Porosity	Kp	1.0	1.0	1.0	1.0
Combination	Kc	1.0	0.9	0.9	1.0
Pressure	Pe	0.00 kPa	-0.37 kPa	Pi -0.12 kPa	0.14 kPa

Design wind load		Downward	Upward
ULS	Wu	0.12 kPa	-0.51 kPa
SLS	Ws	0.09 kPa	-0.38 kPa

Point Load	Down	Up
Puls =	0 kN	0 kN
Psls =	0 kN	0 kN

Client:		Date: Sep 2025	
Project/Job: 16 Kitchener Place		Job No: 220142	
Subject: Ceiling beam		Sheet:	By: CW

MEMBER DESIGN **REFERENCE:** **Ceiling beam**

Member Properties

Serviceability check of beam against deflection criteria

Properties						
Type		2-SG8-Dry		Condition	Dry	
Material		Sawn		E =	6.7	GPa
Depth	d =	240	mm	fb =	14	MPa
Width	b =	90	mm	fs =	3.8	MPa
Length	L =	2.7	m	I =	103.7	e6 mm4
				Z =	864	e3 mm3
Restraint spacing, down	Lay,d	900	mm		*Ceiling joists assumed spacing*	
Restraint spacing, up	Lay,u	900	mm			

Moment Capacity Calculation

K Factors					
Duration of load	k1 =	1.00			*considered elsewhere*
Parallel support (sawn only)	k4 =	1.14			*2 joined members*
Grid system	k5 =	1.00			
Stability down	k8+ =	1.00	*S* =	6.7	
Stability up	k8- =	1.00	*S* =	6.7	
Size factor (LVL only)	k24 =	1.00			
Strength Reduction	Ø =	0.8			

Moment Calculation - down				
Nominal Capacity	Mn =	13.8	kNm	*= k fb z, for k1 = 1 (adjusted in comb. check)*
Design Capacity	ØMn =	11.0	kNm	

Moment Calculation - up				
Nominal Capacity	Mn =	13.8	kNm	*= k fb z, for k1 = 1 (adjusted in comb. check)*
Design Capacity	ØMn =	11.0	kNm	

Shear Capacity Calculation

Calculates shear demand and capacity

Shear Calculation				
Nominal Capacity	Vn =	54.7	kN	*= 2/3 d b fs*
Design Capacity	ØVn =	43.8	kN	

Reduced Area Shear Check				
Tapered depth	dt =	240	mm	
Reduced Capacity	ØVt =	43.8	kN	*= ØVn * dt / d*

Combination Shear Demands	V*1 kN	V*2 kN			
1.35G	3.5	3.5			
1.2G + 1.5Q	5.1	5.1	V*max =	5.1 kN	*Down, with gravity*
1.2G + S	5.1	5.1	V*min =	-0.5 kN	*Uplift*
1.2G + Wd	3.8	3.8			
G + ψeQ + E	3.0	2.6	ØVn =	43.8 kN	OKAY
0.9G - Wu	-0.5	-0.5			
G + ψeQ - E	2.6	3.0			

Client:		Date: Sep 2025	
Project/Job: 16 Kitchener Place		Job No: 220142	
Subject: Ceiling beam		Sheet:	By: CW

CAPACITY CHECK **REFERENCE:** **Ceiling beam**

Load Case Summary & Beam Input

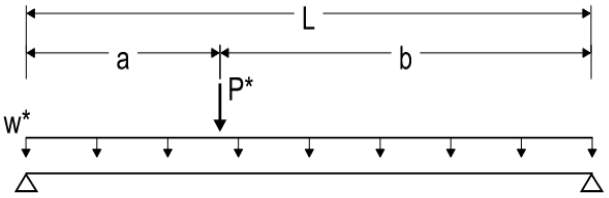
Calculate moment demand for each load case, and input beam type

Load case table

Case		Trib Width tw m	ULS Area kPa	ULS Point Rctn kN	SLS Area kPa	SLS Point Rctn kN	Case Demands M*uls kNm	V*1 kN	V*2 kN
Gravity	G	4	0.48	0.0	0.48	0.0	1.7	2.6	2.6
Live	Q	4	0.25	0.0	0.18	0.0	0.9	1.4	1.4
Snow	S	4	0.38	0.0	0.14	0.0	1.4	2.1	2.1
Wind down	Wd	4	0.12	0.0	0.09	0.0	0.5	0.7	0.7
Wind up	Wu	4	-0.51	0.0	-0.38	0.0	-1.9	-2.8	-2.8
Seismic	E	4	0.00	0.0	0.00	0.0	0.0	0.0	0.0

Beam Property Input

Beam Reference	Ceiling beam	
Beam Type	2-SG8-Dry	
Beam Size	240 x 90	
Length (Span)	L =	2.7 m
	a =	m



Ultimate limit state load combinations

Strength check of beam against ULS combinations

Combinations - Down			M*	k1	k1ØMn +	ULS Ratio	Check
1.35G			2.3 kNm	0.6	6.62 kNm	0.35	OKAY
1.2G + 1.5Q			3.5 kNm	0.8	8.82 kNm	0.39	OKAY
1.2G + S			3.5 kNm	0.8	8.82 kNm	0.39	OKAY
1.2G + Wd			2.5 kNm	1.0	11.03 kNm	0.23	OKAY
G + ψeQ + E	ψe	0.3	2.0 kNm	1.0	11.03 kNm	0.18	OKAY

Combinations - Up			M*	k1	k1ØMn -	ULS Ratio	Check
0.9G - Wu			-0.3 kNm	1.0	11.03 kNm	0.03	OKAY
G + ψeQ - E	ψe	0.3	2.0 kNm	1.0	11.03 kNm	0.18	OKAY

Serviceability limit state load combinations

Serviceability check of beam against deflection criteria

Cases and Combinations			k2	Δ (mm)	Δ_{max}	L/?	Limit L/	Check
G_{short}			1	1.9	6.8	1421	400	OKAY
G_{long}			2	3.8	7.5	710	360	OKAY
ψQ	ψl =	0.7	2	1.4	7.5	1936	360	OKAY
S			1	0.6	7.5	4819	360	OKAY
Wd			1	0.4	7.5	7237	360	OKAY
Wu			1	-1.5	7.5	-1760	360	OKAY
E			1	0.0	9.0	-	300	OKAY
G_l + ψQ	ψl =	0.7	-	5.2	9.0	520	300	OKAY
G_l + Wd			-	4.2	9.0	647	300	OKAY
G_l + Wu			-	2.3	9.0	1191	300	OKAY

Vibration Check

Checks vibration by checking less than 1mm deflection for 1 kN point load. CHECK NOT REQUIRED FOR ROOF BEAM

Load P = 1.0 kN Δ = 0.59 mm OKAY

Client:		Date: Sep 2025	
Project/Job: 18 Kitchener Place		Job No: 220142	
Subject: Ceiling beam		Sheet:	By: CW

LOADS: **REFERENCE:** **Ceiling beam**

Gravity Loads

Calculate dead and selfweight loads acting on the beam

Distributed Load

Item	Value
Roof	0.35 kPa
Ceiling	0.10 kPa
Wall	kPa
Other	kPa
Self *(trib w. as below & Y = 5 kN/m³)*	0.03 kPa
Total	0.48 kPa

Point Load (ie beam reaction)

Puls = 0 kN

Psls = 0 kN

Lower bound distributed gravity

Roof	0.45 kPa
Other	0.00 kPa
Total	0.45 kPa

Live Load

Calculate live loads acting on the beam

Direct Load

Point live load Qp = 1.10 kN

Distributed live load Qudl = 0.25 kPa

SLS CombinationFactor ψl = 0.7

Note: the live point and distributed loads per NZS1170.1 are considered seperately for the wrost case effects on each of M, V & Δ off

Point Load (ie beam reaction)

Puls = 0 kN

Psls = 0 kN

Point loads are intended to represent for example the reaction of another beam landing on this beam being designed.

Snow Load

Calculate snow loads acting on the beam

Distributed Load

Design snow load, ULS Sg,u = 0.38 kPa

SLS/ULS 0.37

Design snow load, SLS Sg,s = 0.14 kPa

Point Load (ie beam reaction)

Puls = 0 kN

Psls = 0 kN

Seismic Load

Calculate seismic loads acting on the beam

Tributary seismic mass E = 0.00 kPa

Seismic Coefficient Cp(t) = 0.00 g

SLS/ULS 0.00

ULS 0.00 kPa

SLS 0.00 kPa

Point Load (ie beam reaction)

Puls = 0 kN

Psls = 0 kN

Wind Load

Calculate wind loads acting on the beam

Site wind ULS Vsite = 34 m/s

Psite = 0.69 kPa

sls/uls 0.75

		External pressures Downward	Upward		Internal Pressures Downward (-ve)	Upward (+ve)
Shape	Cpe	0.0	-0.6	Cpe	-0.2	0.2
Area	Ka	1.0	1.0	Ka	1.0	1.0
Local	Kl	1.0	1.0	Kl	1.0	1.0
Porosity	Kp	1.0	1.0	Kp	1.0	1.0
Combination	Kc	1.0	0.9	Kc	0.9	1.0
Pressure	Pe	0.00 kPa	-0.37 kPa	Pi	-0.12 kPa	0.14 kPa

Design wind load		Downward	Upward
ULS	Wu	0.12 kPa	-0.51 kPa
SLS	Ws	0.09 kPa	-0.38 kPa

Point Load	Down	Up
Puls =	0 kN	0 kN
Psls =	0 kN	0 kN

Client:		Date: Sep 2025	
Project/Job: 18 Kitchener Place		Job No: 220142	
Subject: Ceiling beam		Sheet:	By: CW

MEMBER DESIGN **REFERENCE:** **Ceiling beam**

Member Properties

Serviceability check of beam against deflection criteria

Properties						
Type		HH_hySPAN		Condition	Dry	
Material		LVL		E =	13.2	GPa
Depth	d =	240	mm	fb =	50	MPa
Width	b =	90	mm	fs =	4.6	MPa
Length	L =	3.8	m	I =	103.7	e6 mm4
				Z =	864	e3 mm3
Restraint spacing, down	Lay,d	900	mm		*Ceiling joists assumed spacing*	
Restraint spacing, up	Lay,u	900	mm			

Moment Capacity Calculation

K Factors					
Duration of load	k1 =	1.00			*considered elsewhere*
Parallel support (sawn only)	k4 =	1.00			*1.0 for LVL & Glulam*
Grid system	k5 =	1.00			
Stability down	k8+ =	1.00	*S* =	6.7	
Stability up	k8- =	1.00	*S* =	6.7	
Size factor (LVL only)	k24 =	0.87			
Strength Reduction	Ø =	0.9			

Moment Calculation - down				
Nominal Capacity	Mn =	37.5	kNm	*= k fb z, for k1 = 1 (adjusted in comb. check)*
Design Capacity	ØMn =	33.7	kNm	

Moment Calculation - up				
Nominal Capacity	Mn =	37.5	kNm	*= k fb z, for k1 = 1 (adjusted in comb. check)*
Design Capacity	ØMn =	33.7	kNm	

Shear Capacity Calculation

Calculates shear demand and capacity

Shear Calculation				
Nominal Capacity	Vn =	66.2	kN	*= 2/3 d b fs*
Design Capacity	ØVn =	59.6	kN	

Reduced Area Shear Check				
Tapered depth	dt =	240	mm	
Reduced Capacity	ØVt =	59.6	kN	*= ØVn * dt / d*

Combination Shear Demands	V*1 kN	V*2 kN			
1.35G	4.9	4.9			
1.2G + 1.5Q	7.2	7.2	V*max =	7.2 kN	*Down, with gravity*
1.2G + S	7.2	7.2	V*min =	-0.6 kN	*Uplift*
1.2G + Wd	5.3	5.3			
G + ψeQ + E	4.2	3.6	ØVn =	59.6 kN	OKAY
0.9G - Wu	-0.6	-0.6			
G + ψeQ - E	3.6	4.2			

Client:		Date: Sep 2025	
Project/Job: 18 Kitchener Place		Job No: 220142	
Subject: Ceiling beam		Sheet:	By: CW

CAPACITY CHECK **REFERENCE:** **Ceiling beam**

Load Case Summary & Beam Input

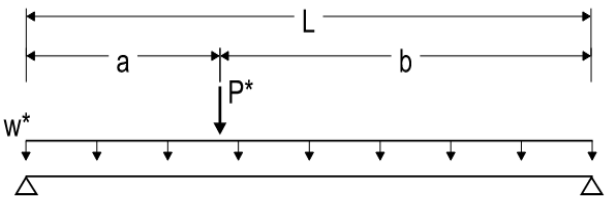
Calculate moment demand for each load case, and input beam type

Load case table

Case		Trib Width tw m	ULS Area kPa	ULS Point Rctn kN	SLS Area kPa	SLS Point Rctn kN	Case Demands M*uls kNm	V*1 kN	V*2 kN
Gravity	G	4	0.48	0.0	0.48	0.0	3.4	3.6	3.6
Live	Q	4	0.25	0.0	0.18	0.0	1.8	1.9	1.9
Snow	S	4	0.38	0.0	0.14	0.0	2.7	2.9	2.9
Wind down	Wd	4	0.12	0.0	0.09	0.0	0.9	0.9	0.9
Wind up	Wu	4	-0.51	0.0	-0.38	0.0	-3.7	-3.9	-3.9
Seismic	E	4	0.00	0.0	0.00	0.0	0.0	0.0	0.0

Beam Property Input

Beam Reference	Ceiling beam	
Beam Type	CHH_hySPAN	
Beam Size	240 x 90	
Length (Span)	L =	3.8 m
	a =	m



Ultimate limit state load combinations

Strength check of beam against ULS combinations

Combinations - Down			M*	k1	k1ØMn +	ULS Ratio	Check
1.35G			4.6 kNm	0.6	20.23 kNm	0.23	OKAY
1.2G + 1.5Q			6.8 kNm	0.8	26.97 kNm	0.25	OKAY
1.2G + S			6.9 kNm	0.8	26.97 kNm	0.25	OKAY
1.2G + Wd			5.0 kNm	1.0	33.71 kNm	0.15	OKAY
G + ψeQ + E	ψe	0.3	4.0 kNm	1.0	33.71 kNm	0.12	OKAY

Combinations - Up			M*	k1	k1ØMn -	ULS Ratio	Check
0.9G - Wu			-0.6 kNm	1.0	33.71 kNm	0.02	OKAY
G + ψeQ - E	ψe	0.3	4.0 kNm	1.0	33.71 kNm	0.12	OKAY

Serviceability limit state load combinations

Serviceability check of beam against deflection criteria

Cases and Combinations			k2	Δ (mm)	Δ_{max}	L/?	Limit L/	Check
G_{short}			1	3.8	9.5	1004	400	OKAY
G_{long}			2	7.6	10.6	502	360	OKAY
ψQ	ψl =	0.7	2	2.8	10.6	1368	360	OKAY
S			1	1.1	10.6	3406	360	OKAY
Wd			1	0.7	10.6	5114	360	OKAY
Wu			1	-3.1	10.6	-1244	360	OKAY
E			1	0.0	12.7	-	300	OKAY
G_l + ψQ	ψl =	0.7	-	10.3	12.7	367	300	OKAY
G_l + Wd			-	8.3	12.7	457	300	OKAY
G_l + Wu			-	4.5	12.7	842	300	OKAY

Vibration Check

Checks vibration by checking less than 1mm deflection for 1 kN point load. CHECK NOT REQUIRED FOR ROOF BEAM

Load P = 1.0 kN Δ = 0.84 mm OKAY

Foundation Pad Design

Design for the new beams alters the load pathway from the roof to the foundation system. The existing load bearing walls are being replaced with beams that have point load reactions onto the existing floor structure which is unable to support the increased point loads. New foundations are proposed in the locations of the new point loads.

ULS Loading
As calculated above, end reaction of the new beams under ULS vertical loads is 7.7 kN, acting downward onto the foundations.

Bearing Capacity
Geotechnical advice was sought from Subterra, who provided an ultimate bearing capacity of 150 kPa at 450 mm below ground level. As ground capacity is relatively low, pad foundations have been designed using a 0.5 reduction factor to ensure adequate bearing resistance for the beam end reactions.

Thus, 75kPa factored capacity, based on phi = 0.5 for ULS.
400sq footing bearing capacity = .4m x .4m x 75kN/m2 = 12kN

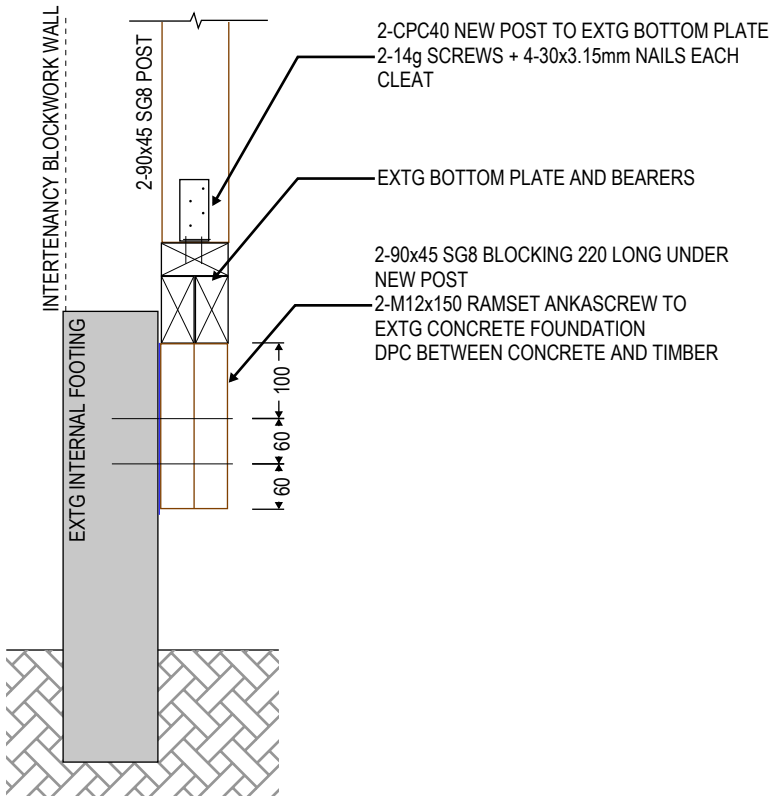
Check
ULS vertical loading of 7.7kN < Footing bearing capacity of 12kN
Thus, a 400 sq footing is OK for all new standalone piles.

Subfloor anchor design

Post ULS Axial demand = 7.7 kN
Per Beam design worksheet

Provide new subfloor blocking beneath post and fix to internal foundation with M12 concrete anka screw 150 long.

Allows 60mm effective embedment after allowing for 90mm timber blocking. Ankascrew design based on 50mm effective embedment therefore OK



7 / - END POST SUPPORT ON INTERNAL FOOTING
1:10

CALCULATION SHEET FOR RAMSET ANCHORS

Company :	Phone number :
Carried out by :	Mail address :
Company :	Project name : False Pile
Contact name :	Location :
Phone number :	Fastening point :
Mail address :	
Comment :	

Recommended anchors

AnkaScrew Xtrem min. anchorage 12x110

Product Code:	AS12110X
Effective embedment :	50 mm
ETA-20/0731 issued 2020/11/13	

Base material

Concrete resistance :	C25/30 - fck,cyl = 25 N/mm²
Cracking of concrete :	Cracked concrete
Thickness of concrete :	150 mm
Reinforcement type :	Wide concrete reinforcement
Edge reinforcement :	No edge reinforcement

Reinforcement to limit crack width to Wk = 0,3 mm

Conditions

Installation conditions :	Dry concrete
Short term temperature :	40 °C
Long term temperature :	24 °C

Anchor plate

Thickness of part to be fixed :	45 mm
Recommended plate thickness :	The base plate thickness has not been checked
Clearance diameter :	16 mm
Profile :	
Profile position :	Ex = 0 mm ; Ey = 0 mm
Stand-off :	None

Design method : European/NZS 3101 for static, quasi-static loading

Design Actions :

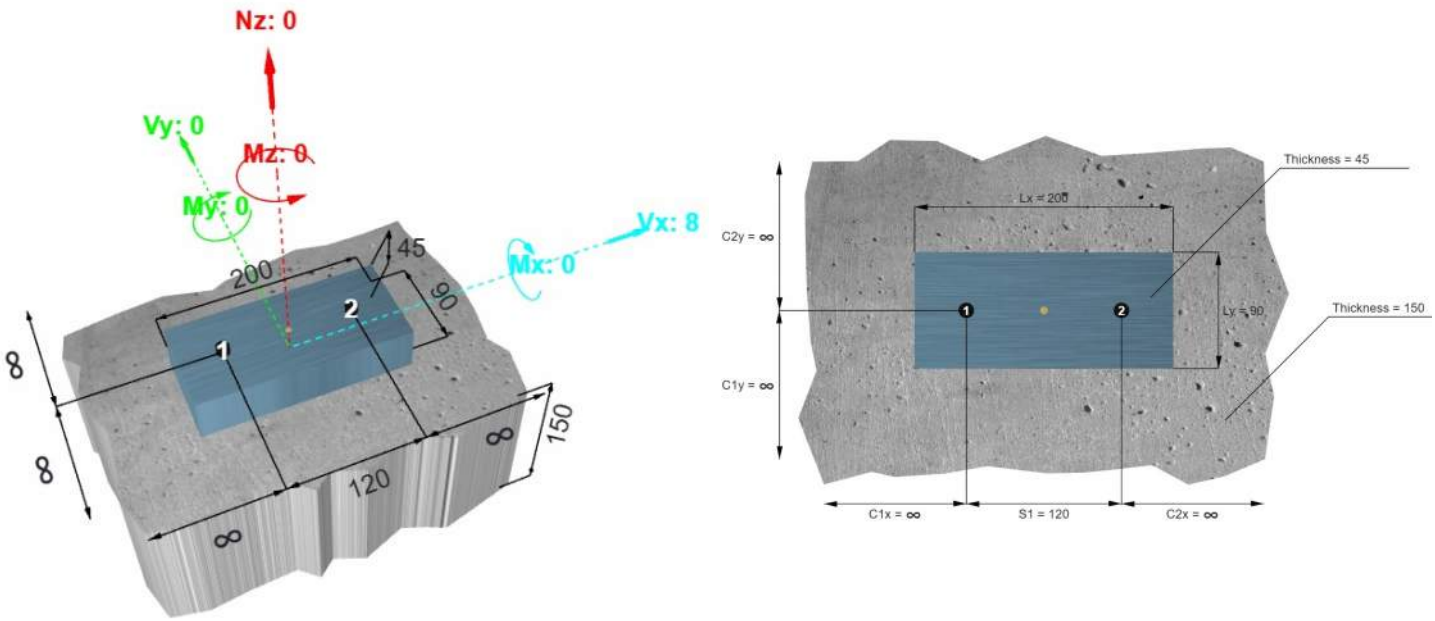
Action [kN] / [kNm]	Action type	N_{Ed}	$V_{Ed,X}$	$V_{Ed,Y}$	$M_{Ed,Z}$	$M_{Ed,X}$	$M_{Ed,Y}$
Combination 1	standard	0	8	0	0	0	0

Specifications :

Static

Sustained Load : False

Geometry :



Calculation Hypothesis :

- The anchoring plate is assumed to be sufficient to resist deformation imposed by the load actions.
- Connection between profile and base plate has not been checked
- The calculation is done acc. to expert judgement, based on EN 1992-4

- RAMSET can only be held responsible if the calculation examples exactly reflect the application and if the installation is carried out according to the instruction given in the RAMSET specifications. The calculation is correct for RAMSET anchors only. The contractor or specifier should make sure that the base material is able to support the loads especially in the case of a group of anchors. RAMSET cannot be held responsible if this software package is modified without its written approval.

Resulting anchors forces

Loads on anchors

Anchor	Tensile	Shear[x]	Shear[y]
1	0 kN	4 kN	0 kN
2	0 kN	4 kN	0 kN

N^g_{Sd} [kN]	N^h_{Sd} [kN]	e_{Nx} [mm]	e_{NY} [mm]
0	0	0	0
V^g_{Sd} [kN]	V^h [kN]		
8	4		

Utilization

Tension load	Tension force [kN]	Strength [kN]	β_N [%]
Pull out failure	/	/	/
Concrete cone failure	/	/	/
Splitting failure	/	/	/
Steel failure	/	/	/

Shear load	Shear force [kN]	Strength [kN]	β_V [%]
Concrete Edge failure	/	/	/
Pryout failure	8	16.33	48.98
Steel failure	4	32	12.5

Combined tension and shear loads

β_V = [0.13] ≤ 1

THE APPLICATION IS SAFE

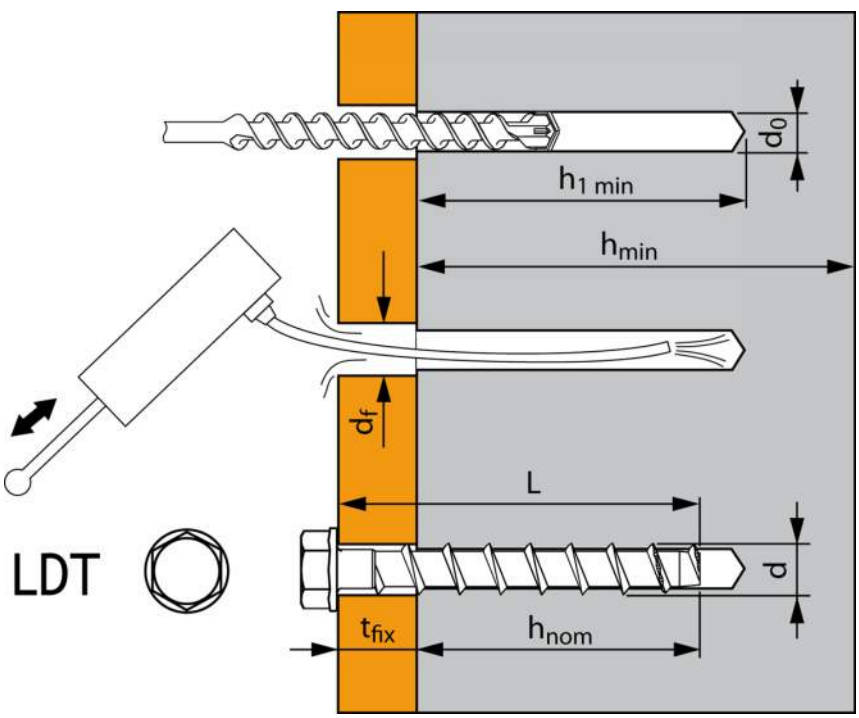
INSTALLATION DATA

AnkaScrew Xtrem min. anchorage 12x110

Product Code: AS12110X
Effective embedment : 50 mm
ETA-20/0731 issued 2020/11/13

Effective embedment :	50 mm
Minimum thickness of base material :	80 mm
Hole diameter in the base material :	12 mm
Hole depth in the base material :	75 mm
Installation torque :	60.00 Nm
Base plate thickness :	45 mm
Profile family (section type) :	
Clearance diameter :	16 mm

INSTALLATION Method



Bracing

To meet the building code intent of not making the structure worse during the alterations, it is proposed to re-line an existing and new hallway walls within both properties with GIB Braceline to restore the bracing capacity lost through the wall removals.

No original bracing calculations are available, however on the basis of it being an estimated 1940's build, it is unlikely that any specific bracing design was completed. Therefore the assumed reduction in bracing capacity due to the alterations is based on the following assumptions:
- 2 sided plasterboard sheet lining wall
- Fixings at 300mm crs
- Bracing capacity of 2 kN/m (or 40BU/m) per C9 Timber Building seismic assessment guidelines

16 Kitchener Place (x-direction)

Lost bracing
Wall length reduced by 3.7m, thus a loss in bracing capacity of 3.7m * 40BU/m = 148 Bu

We are also removing the linings on one side of two other wall section to install a new GIB bracing system. The overall length of relined wall is 2m.

Therefore the total loss of seismic bracing capacity is 148 BU + 2.0m * 20 BU/m = 188 BU

Reinstated bracing capacity
Provide 2.1m of Gib Braceline BL1-H one side with panel hold-down fixings, with a seismic capacity of 100 BU/m.

Total gain of seismic/wind bracing capacity = 2.1m * 100 BU/m = 210 BU

Net Change
From the proposed alterations, there is a net improvement in bracing capacity of seismic/wind bracing capacity = 22 BU

16 Kitchener Place (y-direction)

Lost bracing
Wall length reduced by 2.2m, thus a loss in seismic bracing capacity of 2.2m x 40BU/m = 88 BU.

Reinstated bracing capacity
Provide 2.5m of Gib GS2-N plasterboard on both sides, with a seismic capacity of 85 BU/m.

Total gain of seismic/wind bracing capacity = 2.5m * 85 BU/m = 212.5 BU

Net Change
From the proposed alterations, there is a net improvement in bracing capacity of seismic/wind bracing capacity = 124.5 BU

18 Kitchener Place (x-direction)

Lost bracing
Wall length reduced by 4.8m, thus a loss in seismic bracing capacity of 4.8m x 40BU/m = 192 Bu

Reinstated bracing capacity
Provide 3.7m of Gib GS2-N plasterboard on both sides, with a seismic capacity of 85 BU/m.

Total gain of seismic/wind bracing capacity = 3.7m * 85 BU/m = 314.5 BU

Net Change
From the proposed alterations, there is a net improvement in bracing capacity of seismic/wind bracing capacity = 122.5 BU

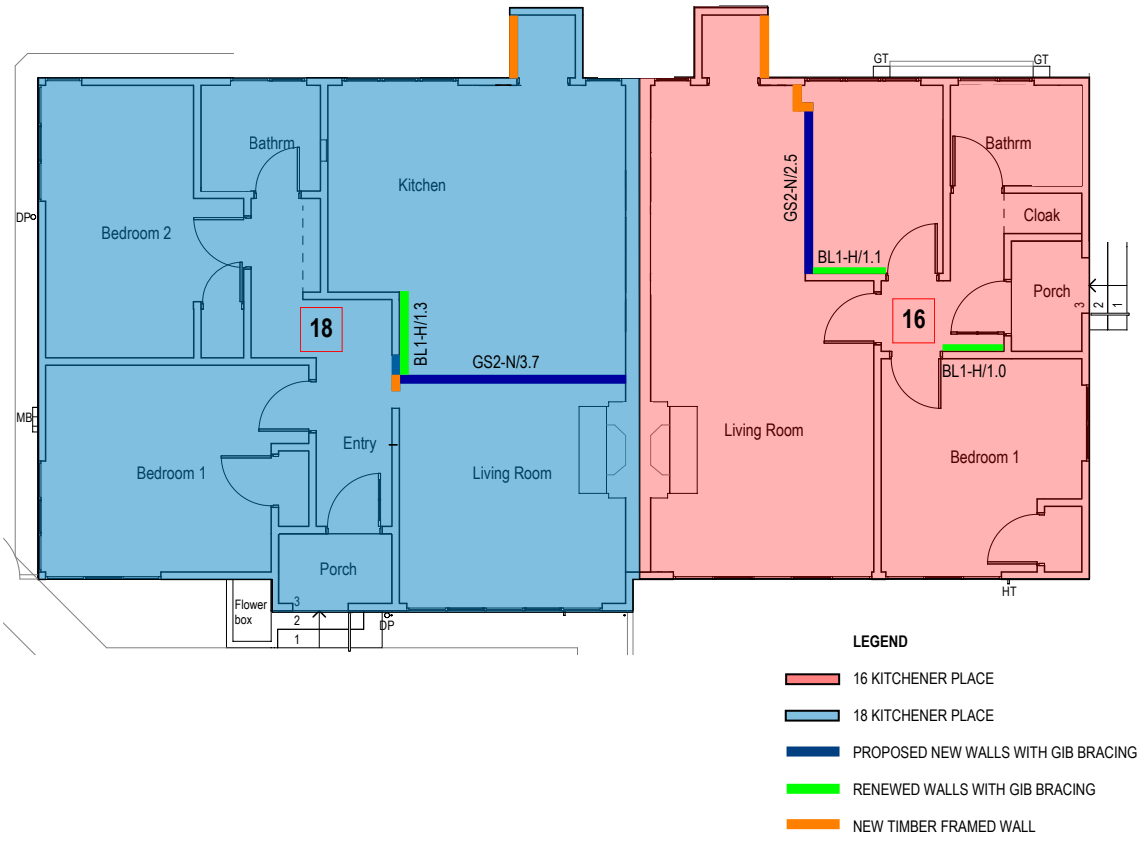
18 Kitchener Place (y-direction)

Lost bracing
Wall length reduced by 2.4m, thus a loss in seismic bracing capacity of 2.4 x 40 = 96 BU.

Reinstated bracing capacity
Provide 1.3m of Gib Braceline BL1-H one side with panel hold-down fixings, with a seismic capacity of 105 BU/m.

Total gain of seismic/wind bracing capacity = 1.3m * 105 BU/m = 136.5 BU

Net Change
From the proposed alterations, there is a net improvement in bracing capacity of seismic/wind bracing capacity = 40.5 BU



GIB Ezybrace® Systems 2016 BU/m Ratings

Issue Date September 2016

The BU/m ratings for GIB EzyBrace® Systems shown below are responsibly conservative and are provided to allow manual calculation, and for use in alternative proprietary software.

The GIB EzyBrace® 2016 software delivers more accurate demand calculations based on specific building parameters entered, and bracing resistance (BU/m) is often higher than the values presented below. Do not use this table to assess bracing substitutions.

Table 1: GIB® Standard Bracing Unit Ratings

Type	Minimum Length (m)	Lining	Other Requirements	BU/m	
				W	EQ
GS1-N	0.4	GIB® Standard plasterboard one side	N/A	50	55
	1.2			70	60
GS2-N	0.4	GIB® Standard plasterboard both sides	N/A	70	65
	1.2			95	85
GS2-NOM	0.4	GIB® Standard plasterboard both sides (standard GIB® site guide fastener pattern)	N/A	50	50
GSP-H	0.4	GIB® Standard plasterboard one side, structural plywood the other	Panel hold-down fixings	100	115
	1.2			150*	150*

Table 2: GIB Braceline® Bracing Unit Ratings

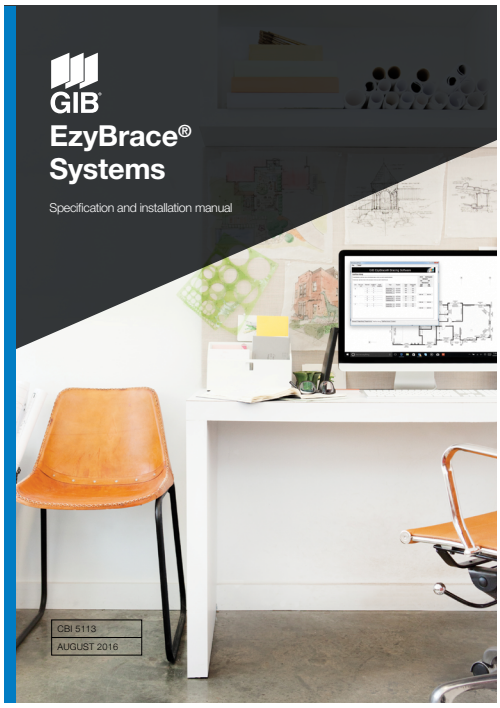
Type	Minimum Length (m)	Lining	Other Requirements	BU/m	
				W	EQ
BL1-H	0.4	GIB Braceline® one side	Panel hold-down fixings	90	100
	1.2			125*	105
BLG-H	0.4	GIB Braceline® one side, GIB® Standard plasterboard the other	Panel hold-down fixings	110	115
	1.2			150*	145*
BLP-H	0.4	GIB Braceline® one side, structural plywood the other	Panel hold-down fixings	120*	135*
	1.2			150*	150*

** Timber Floors – A limit of 120 BU/m for NZS 3604:2011 timber floors applies unless specific engineering ensures that uplift forces generated by elements rated higher than 120 BU/m can be resisted by floor framing.*

B1 Bracing

BRANZ Appraised
Appraisal No. 928 [2021]

GIB EZYBRACE® SYSTEMS



Appraisal No. 928 (2021)

This Appraisal replaces BRANZ Appraisal No. 928 [2016]

BRANZ Appraisals

Technical Assessments of products for building and construction.

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Product

1.1 GIB EzyBrace® Systems are a range of wall and ceiling bracing systems based on the use of GIB® Standard, GIB Braceline® and other GIB® plasterboards. GIB EzyBrace® Systems are used to resist earthquake and wind loads on timber-framed buildings designed and constructed in accordance with NZS 3604 and the GIBFix® Framing System. The GIB EzyBrace® Bracing Software provides an electronic means of calculating bracing demand and resistance.

Scope

2.1 GIB EzyBrace® Systems and the GIB EzyBrace® Bracing Software have been appraised for the design and use of interior wall and ceiling bracing systems in buildings within the scope limitations of NZS 3604.

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, GIB EzyBrace® Systems, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:**

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. GIB EzyBrace® Systems meet the requirements for loads arising from self-weight, earthquake, wind and impact [i.e. B1.3.3 (a), (f), (h) and (j)]. See Paragraphs 8.1-8.10.

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years. GIB EzyBrace® Systems meet this requirement. See Paragraphs 9.1-9.4.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. GIB EzyBrace® Systems meet this requirement.

Technical Specification

4.1 The GIB® plasterboards and accessories used with the GIB EzyBrace® Systems, and supplied or specified by Winstone Wallboards Ltd are as follows:

GIB® plasterboards

- **GIB® Standard** - GIB® Standard plasterboard is a paper-bound, fibreglass reinforced gypsum-plaster core sheet lining material. GIB® Standard plasterboard is available in 10 mm and 13 mm thicknesses and a sheet width of 1,200 mm and 1,350 mm (GIB® Wideline). The sheets have a taper on the two long sheet edges. The 10 mm thick sheets are also available with a square edge. Sheets are available in various lengths from 2,400 mm to 6,000 mm. The nominal sheet weight is 6.5 kg/m² for 10 mm thick sheets and 8.5 kg/m² for 13 mm thick sheets. GIB® Standard plasterboard face paper is a light buff colour.
- **GIB Braceline®** - GIB Braceline® is a high-density fibreglass reinforced, paper-bound gypsum-plaster core sheet lining material. GIB Braceline® is available in 10 mm and 13 mm thicknesses. The sheets have a taper on the two long sheet edges. GIB Braceline® has a sheet width of 1,200 mm and 1,350 mm, and is available in lengths of 2,400 mm, 2,700 mm, 3,000 mm, 3,600 mm and 4,800 mm. The nominal sheet weight is 9 kg/m² for 10 mm thick sheets and 12.5 kg/m² for 13 mm thick sheets. GIB Braceline® face paper is light blue in colour.
- **Alternative GIB® plasterboards** - in certain situations, as specified in the Technical Literature, substitution is permitted with GIB Aqualine®, GIB Fyreline®, GIB Toughline® and GIB Ultraline®.

Components and Accessories

- **GIB® Accessories and GIB® Jointing Compounds** - as specified in the GIB® Site Guide Technical Literature.
- Fasteners
  - **GIB Grabber® High Thread Screws for fixing directly to timber** – 32 mm x 6 g.
  - **GIB Nail** – 30 x 2.8 mm.
  - **GIB Grabber® screws for fixing to light gauge steel battens** – 32 mm x 6 g.
- Adhesive and Sealants
  - **GIBFix® One** – an off-white acrylic adhesive supplied in 375 ml cartridges and 600 ml sausages.
  - **GIBFix® All-Bond** – a green solvent-based adhesive supplied in 375 ml cartridges and 600 ml sausages.
- GIBFix® Framing Components
  - **GIBFix® Angle** – 45 x 45 x 0.55 mm galvanised steel angle with a knurled surface. Supplied in lengths of 2.4 m and 2.7 m.
  - **GIB Grabber® Dual Thread Screws for fixing to timber through GIBFix® Angle** – 32 mm x 7 g needle-point screw with coarse thread lower section and fine thread upper section.
- Fasteners, Anchors and Connections
  - **GIB® HandiBrac®** – a one-piece, 2 mm thick, galvanised steel angle bracket approximately 95 mm high, 65 mm long and 54 mm wide. The bracket is supplied with five Type 17 screws, 14 g x 35 mm.
  - **BOWMAC® screw bolt** – M10 x 140 mm screw anchor, with a blue painted hex head.
  - **Coach screws** – 12 mm x 150 mm and 50 x 50 x 3 mm washer, hot-dip galvanised for fixing to timber floors.
  - **Cast-in bolts** – M12 x 150 mm minimum and 50 x 50 x 3 mm washers for fixing to concrete floors.
  - **Shot-fired fasteners** – minimum 75 mm x 3.8 mm with 16 mm discs for fixing GS1-N, GS2-N and GS2-NOM internal line bracing elements to concrete slabs.
  - **Galvanised or stainless steel strap** – 25 x 0.9 mm top and bottom plate connections.
  - **Strap fixings** – 30 x 2.5 mm hot-dip galvanised or stainless steel flat head nails. *(Note: For corrosion protection requirements, refer to NZS 3604, Section 4.)*

- **Ceiling Diaphragms** - ceiling diaphragms are constructed using timber ceiling battens, or GIB® Rondo® or similar metal ceiling batten systems.
- **Plywood**
  - **Plywood** – minimum of 7 mm thick complying with AS/NZS 2269 D-D Structural Grade.
  - **Plywood fixings** – 50 x 2.5 mm hot-dip galvanised or stainless steel annular-grooved, flathead nails.

Handling and Storage

5.1 The best results are achieved when GIB® plasterboards are treated as a finishing material and protected from damage. Sheets must be stacked flat and kept dry at all times. For limits on stack heights see the GIB® Site Guide. Sheets must be carried on edge and not dragged.

5.2 All accessories must be kept dry.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for GIB EzyBrace® Systems. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

7.1 NZS 3604 provides methods to distribute the bracing elements in walls to resist forces. The use of ceiling diaphragms is defined in the Technical Literature.

7.2 GIB EzyBrace® Systems are for use in dry, internal situations only.

7.3 GIB EzyBrace® Systems must not be exposed to temperatures of 52°C or greater for prolonged periods. Refer to appliance and fitting manufacturers for installation details.

GIB EzyBrace® Bracing Software

7.4 The GIB EzyBrace® Bracing Software contains design procedures and an electronic calculation method for bracing demand calculated in accordance with NZS 3604, Section 5. Floor loadings can be selected in accordance with either NZS 3604, Bracing Demand Tables 5.5–5.10 for 2 kPa floor loads or less, or Tables 14.1–14.3 for 3 kPa floor loads.

7.5 The bracing demand calculations contained in the GIB EzyBrace® Bracing Software are based on first principles engineering and calculate wind and earthquake demand, based on the building parameters entered. Resulting bracing demand calculations are project specific and can differ from values derived using NZS 3604 wind and earthquake demand tables. The GIB EzyBrace® Bracing Software has been assessed as part of this Appraisal.

7.6 The bracing ratings for GIB EzyBrace® Systems are embedded in the GIB EzyBrace® Bracing Software.

GIBFix® Framing System

7.7 The GIBFix® Framing System utilises GIBFix® Angles fixed at internal corners and at wall/ceiling junctions to reduce the potential for fastener 'popping' and joint cracking due to timber framing movement. The GIBFix® Framing System also offers an alternative arrangement of studs at corners and at intersecting walls to improve insulation and to reduce thermal bridging compared to traditional wall framing layouts. Refer to the Technical Literature for full details.

7.8 Where walls intersect, noggings are required at maximum 900 mm centres to enable fixing of the end stud of the intersecting wall to the main wall framing.

7.9 The GIBFix® Framing System permits the use of a single panel hold-down [e.g. GIB® HandiBrac®] at wall corners and T-intersections for both the across and along bracing directions.

Framing

7.10 GIB EzyBrace® Systems can be installed using conventional timber framing layouts or by using the layouts provided in the GIBFix® Framing System. The bracing ratings embedded in the GIB EzyBrace® Bracing Software are equally applicable to both framing options.

7.11 Timber framing grade, spacing and construction must comply with NZS 3604. Timber treatment must comply with NZBC Acceptable Solution B2/AS1.

7.12 Winstone Wallboards Ltd recommends the use of kiln-dried stress-graded framing timber. The minimum actual framing dimensions are 90 mm x 45 mm for external walls and 75 mm x 45 mm for internal walls.

7.13 Joints in the top plates of bracing panels must be tied together with 3 kN and 6 kN top plate connectors using 25 mm x 0.9 mm hot-dip galvanised mild steel strap, three nails each side of joint for 3 kN and six nails each side of joint for 6 kN.

Bracing System GS2-NOM

7.14 Most GIB EzyBrace® Systems require additional fasteners at the corners to achieve the published bracing ratings. The GS2-NOM system only requires fixings at 300 mm centres around the sheet perimeter.

7.15 Where internal doors penetrate a GS2-NOM bracing element and recessed door jambs are used, the sheets may be adhesive fixed around the door opening with GIBFix® All-Bond, instead of screw fixing. This is designed to reduce fastener 'popping' around internal doors when using grooved door frames. Screw fixing should be used where door frames are to be finished with architraves and the architrave will cover the screws. The adhesive fix option around door openings must not be used with any other GIB EzyBrace® Systems.

Alternative GIB® plasterboards

7.16 GIB Ezybrace® Systems have been designed and tested using only the products specified. Occasionally additional properties may be required to be provided by a different GIB® plasterboard product. Table 1 provides acceptable alternative options.

Table 1: Permitted Alternatives in GIB EzyBrace® Systems

Specified	Permitted alternative GIB® plasterboard products								
GIB® plasterboard	GIB® Standard	GIB Ultraline®	GIB Braceline/ Noiseline®	GIB Aqualine®	GIB Toughline®	GIB Fyreline®			
						10 mm	13 mm	16 mm	19 mm
GIB® Standard	N/A	✓	✓	✓	✓	✓ *Note 1*	✓ *Notes 1 and 3*		
GIB Braceline®	X	X	N/A	✓ *Note 2*	✓	X	✓ *Notes 1, 2 and 3*		

- ***Note 1:*** *The fastener type and length and must be as required for the relevant Fire Resistance Rating (FRR) system but the fixing pattern must be as required for bracing elements.*
- ***Note 2:*** *The bracing element must be 900 mm or longer. Fasteners must be at maximum 100 mm centres to the perimeter of the bracing element. The bracing corner fastening pattern applies to all four corners of the element.*
- ***Note 3:*** *Specify traditional wall framing layout where a FRR is required. See Paragraph 11.4.*

BOWMAC Screw Bolts

7.17 When BOWMAC Screw Bolts are used as fixings for external walls with concrete masonry header block foundations, the minimum grout/concrete strength must be as specified in NZS 3604. BOWMAC Screw Bolts may be used in Corrosion Zones B and C as defined in NZS 3604. BOWMAC Screw Bolts may only be used in NZS 3604 Corrosion Zone D where the minimum concrete cover to the bolt is 60 mm. This cannot be achieved with standard 90 mm wide timber framing. An alternative option in this scenario is to use 140 mm wide framing.

Structure

Bracing

8.1 The bracing unit (BU) ratings are embedded in the GIB EzyBrace® Bracing Software and vary with the wall length.

8.2 The Technical Literature provides comprehensive construction and panel hold-down details. These include bottom plate fixings using anchor screws and cast-in bolts (concrete), coach screws (timber), GIB® HandiBrac® or nailed stud-to-plate straps.

8.3 Bracing units derived from the BRANZ P21 test method are based on a wall height of 2.4 m. The GIB EzyBrace® Bracing Software calculates bracing ratings for higher wall heights by multiplying the appropriate bracing rating by 2.4 m and dividing by the actual wall height in metres. For walls less than 2.4 m in height, the GIB EzyBrace® Bracing Software calculates bracing ratings as if they were 2.4 m high.

8.4 NZS 3604 limits wall bracing elements to a maximum of 120 BU/m for timber-framed floors and 150 BU/m for concrete floors.

Ceiling Diaphragms

8.5 GIB® ceiling diaphragms are used to space bracing lines further apart than 6 m. The basic shape of a ceiling diaphragm must be square or rectangular and the length must not exceed twice the width.

8.6 For ceiling diaphragms not steeper than 15° and not exceeding 7.5 m in length, any GIB® plasterboard may be used provided the perimeter fixing are at 150 mm centres.

8.7 For ceiling diaphragms not steeper than 45° and not exceeding 7.5 m in length, and for diaphragms not steeper than 25° and not exceeding 12 m in length, any GIB® plasterboard may be used provided the perimeter fixings are at 100 mm centres.

Openings in Bracing Elements

8.8 Small openings of 90 x 90 mm or less may be placed anywhere except within 90 mm of the edge of the bracing element.

Shower Areas

8.9 GIB EzyBrace® Systems must not be located in shower cubicles or behind baths and the like. GIB EzyBrace® Systems may be used in water-splash areas provided they are protected as required by NZBC Clause E3 Internal Moisture. Refer to BRANZ Appraisal No. 427 GIB® Wet Area Systems.

Impact Resistance

8.10 GIB® plasterboards provide adequate resistance to soft body impact, based upon history of use in domestic and light commercial applications.

Durability

9.1 GIB EzyBrace® Systems, including linings and their fixings, have a serviceable life of at least 50 years. The ability of the systems to remain durable is dependent on them remaining dry in service, and being maintained in accordance with this Appraisal.

Maintenance

9.2 The building must be maintained weatherproof and GIB® plasterboards must be protected from external and internal moisture in accordance with NZBC Clauses E2 and E3.

9.3 Holes resulting from damage to the lining, up to 100 x 100 mm square, will have no significant effect on the performance of the bracing panel. Such holes may be repaired by patching, stopping and finishing as appropriate. Independent expert advice must be sought to assess the effect and repair of larger areas of damage.

9.4 Bracing elements require no ongoing maintenance, apart from decoration and the repair of any damage.

Prevention of Fire Occurring

10.1 Separation or protection must be provided to the GIB EzyBrace® Systems from heat sources such as fireplaces, heating appliances and chimneys. Part 7 of NZBC Verification Method C/VM1 and NZBC Acceptable Solution C/AS1, and NZBC Acceptable Solution C/AS2 provide methods for separation and protection of combustible materials from heat sources.

Fire Affecting Areas Beyond the Fire Source

11.1 For internal surface finish properties and fire resistance ratings, refer to BRANZ Appraisal No. 289 GIB® Fire Rated Systems.

Internal Moisture

12.1 GIB® plasterboard must be used in dry internal situations, and must not be used where likely to be exposed to liquid water, or where extended exposure to humidity above 90% RH is expected, e.g., such as may be expected in sauna rooms, commercial kitchens and the like.

Installation Information

Installation Skill Level Requirement

13.1 Installation of GIB EzyBrace® Systems must be completed by, or under the supervision of a Licensed Building Practitioner with the relevant Licence Class, in accordance with the Technical Literature and this Appraisal.

General

14.1 GIB EzyBrace® Systems must be installed in accordance with the Technical Literature. For inspection, reference must be made to the Technical Literature.

Framing

14.2 To achieve an acceptable decorative finish, the GIB® Site Guide specifies that walls must not be lined unless the moisture content of timber framing is less than 18%. Winstone Wallboards Ltd recommends a moisture content of 12% or less where buildings are to be air conditioned, centrally heated or have heat pumps installed.

14.3 Where the GIBFix® Framing System is used, GIBFix® Angles are tacked to the framing with flat head clouts prior to installation of the GIB® plasterboard.

Cutting

14.4 GIB® plasterboard is easily cut by scoring the face paper with a sharp short-bladed trimming knife, and then snapping the plasterboard away from the cut face and cutting the back paper or by sawing. Use of a metal straightedge facilitates clean straight cuts. Cut edges can be tidied up by using a knife. Paper dags should be removed.

Hold-downs

14.5 GIB EzyBrace® Systems which require hold-downs must either have a GIB® HandiBrac® fitted to each end of the bracing element or alternatively a metal stud-to-plate strap and hold-down anchor may be used. Refer to the Technical Literature for full installation details. Where a metal stud-to-plate strap is used, the hold-down anchor must be placed no more than 80 mm from the end of the bracing element.

14.6 Where the GIBFix® Framing System is used, a single hold-down located at a wall intersection may be used to provide the hold-down in both the across and along bracing directions.

Plasterboard Sheet Fixing

14.7 Corner fixings must be 50 mm away from the sheet corner. Fixings must be no closer than 12 mm from the paper-bound sheet edge, and no closer than 18 mm from a cut edge, and driven at right angles to the sheet until the head is seated in a slight dimple just below the surface of the paper liner. Fixings must not be over-driven.

14.8 Wall bracing plasterboards (except for those used with the GS2-NOM system) are fixed at 150 mm centres around the perimeter framing of the bracing element *(Note: There is a variation for GIB Aqualine® and GIB Fyreline®, see Table 1)*. At the corners of the wall bracing elements, a special fastening pattern is required with fasteners spaced at 50 mm, 100 mm, 150 mm, 225 mm and 300 mm from the corner and thereafter at 150 mm centres. Fixing to other framing is either mechanical or by using GIBFix® adhesives.

14.9 When installing GS2-NOM bracing elements, the GIB® plasterboard is fixed to framing around the bracing element perimeter and at sheet joints with fasteners at maximum 300 mm centres. Where recessed door jambs are used on internal door frames, the GIB® plasterboard may be fixed to the framing around the door opening with GIBFix® All-Bond, see Paragraph 7.15.

14.10 Where GIB Aqualine® or GIB Fyreline® substitutes for GIB Braceline®, bracing elements must be longer than 900 mm and the bracing element perimeter fasteners must be spaced at 100 mm centres and the corner pattern described in Paragraph 14.8 used.

14.11 Full sheets must be used wherever possible.

Fire Resistance Rated Bracing Elements

14.12 Where a bracing element is also used as a fire-rated element, the method of fixing (including the length of the fixing specified) for the fire-rated element must be used, but the perimeter fixings of the bracing element must be at 150 mm centres and fixings at corners of the bracing element must be fixed as described in Paragraph 14.8. In two-layer systems, the inner layer must be used for bracing.

Plywood Fixing

14.13 Plywood is nail fixed at 150 mm centres around the perimeter of each sheet and at 300 mm centres to intermediate framing.

Ceiling Diaphragms

14.14 All GIB EzyBrace® System ceiling diaphragms require fixings around the perimeter at 100 mm or 150 mm centres, depending on the ceiling pitch and length. See Paragraphs 8.4-8.6 and refer to the Technical Literature.

14.15 The perimeter of the ceiling diaphragm is fixed to GIBFix® Angles, GIB® Rondo® perimeter channels, or alternatively, to an additional ex 150 x 40 mm timber plate fixed to the top plate.

Jointing and Finishing

14.16 All bracing element joints must be reinforced with GIB® tape and finished in accordance with the GIB® Site Guide.

Health and Safety

15.1 Dust resulting from the sanding of stopping and finishing compounds may be a respiratory irritant, and the use of a suitable facemask is recommended.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

16.1 Bracing tests were carried out by Winstone Wallboards Ltd in accordance with BRANZ Technical Paper P21 to determine the performance of GIB EzyBrace® Systems when the building is subjected to lateral wind or earthquake loading. Nail and screw slip tests were carried out by BRANZ and Winstone Wallboards Ltd. Winstone Wallboards Ltd's test facilities, procedures and results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

17.1 The GIB EzyBrace® Bracing Software has been assessed by BRANZ and found to be satisfactory.

17.2 The GIB EzyBrace® Systems and GIB® Site Guide Technical Literature have been examined by BRANZ and found to be satisfactory.

17.3 Site inspections were carried out by BRANZ to assess the practicability of the installation of the systems, and to view completed installations.

17.4 An assessment was made of the durability of the systems by BRANZ technical experts and found to be satisfactory.

17.5 The properties of Winstone Wallboards Ltd GIB® plasterboards have been assessed for the following properties: MOR, MOE, paper tensile strength, paper shear strength, nail pull resistance, Hunter hardness, inspection for fungal spores, and hard and soft body impact tests.

Quality

18.1 Winstone Wallboards Ltd's manufacturing process and details of the quality and composition of the materials, have been examined by BRANZ and found to be satisfactory.

18.2 The quality management systems of Winstone Wallboards Ltd have been assessed and registered by TELARC as meeting the requirements of ISO 9001, Registration No. 581.

18.3 Winstone Wallboards Ltd is responsible for the quality of the product supplied.

18.4 The quality of the application and finish on-site is the responsibility of the installation and stopping contractors.

18.5 Designers are responsible for the design of buildings.

18.6 Building owners are responsible for the maintenance in accordance with the instructions of Winstone Wallboards Ltd.

Sources of Information

- AS/NZS 2269.0:2012 Plywood - Structural - Specifications.
- AS/NZS 2588:2018 Gypsum plasterboard.
- BRANZ Technical Paper P21:2010 A wall bracing test and evaluation procedure.
- NZS 3604:2011 Timber-framed buildings.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

BRANZ

In the opinion of BRANZ, GIB EzyBrace® Systems are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Winstone Wallboards Ltd, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
   a) relates only to the product as described herein;
   b) must be read, considered and used in full together with the Technical Literature;
   c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
   d) is copyright of BRANZ.
2. Winstone Wallboards Ltd:
   a) continues to have the product reviewed by BRANZ;
   b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
   c) abides by the BRANZ Appraisals Services Terms and Conditions;
   d) warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
   a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
   b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
   c) any guarantee or warranty offered by Winstone Wallboards Ltd.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to Winstone Wallboards Ltd or any third party.

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
01 December 2021

C/AS1 Fire

Two way FRR – double timber frame with GIB Barrierline® central barrier

Specification number	Performance		Specifications	
GBTLAB 60d	**STC**	61	**Lining**	1 x 13mm GIB® Standard each side
	Rw	60	**LB/NLB**	Load bearing
	FRR	60/60/60	**Partition**	286–316mm wide

TIMBER FRAMING

Stud size	Space between frames
90mm	80–110mm

Framing to comply with:

- NZBC B1 – Structure: AS1 Clause 3 – Timber (NZS 3604) or VM1 Clause 6 – Timber (NZS 3603).
- NZBC B2 – Durability: AS1 Clause 3.2 – Timber (NZS 3602).

Maximum height as determined by NZS 3604 stud and top plate tables for load-bearing walls.

CENTRAL BARRIER

- Allow a 25–40mm gap between each timber frame and the GIB Barrierline® central barrier.
- Fix GIB® Rondo® 140 Perimeter Channels to the concrete floor with steel fasteners at 600mm centres and no more than 50mm from channel ends using 3.5mm x 30mm or 4.0mm x 25mm concrete nails or 6mm x 40mm concrete anchors.
- A 5mm gap between GIB® Rondo® 140 Perimeter Channels will let any collected rain water escape.
- GIB® Rondo® 140 Perimeter Channel to be sealed to the floor slab on one side with exterior fire/acoustic sealant.
- Install 25mm GIB Barrierline® into GIB® H-Studs at 600mm centres.
- Cap GIB Barrierline® ends with GIB® Rondo® 140 Perimeter Channel.
- Offset GIB® H-Studs from wall studs to allow attachment of GIB® Wall Clips to both frames. Nog as required where no framing exists.
- Place two GIB® Wall Clips (one each side) no more than 600mm below the top of each GIB® H-Stud, no further apart than 3000mm vertically.
- Fix GIB® Rondo® 140 Perimeter Channel at wall ends to both timber frames with GIB® Wall Clips or GIB® Wall Straps placed no further apart than 3000mm vertically.
- Use no more than two GIB® Wall Clips or GIB® Wall Straps (one each side) for each 3000mm length of GIB® H-Stud or GIB® Rondo® 140 Perimeter Channel.
- In the roof space, fix a 13mm GIB Weatherline® or 13mm GIB Fyreline® Laminate to one side of the GIB Barrierline® with GIB® Laminator Screws or 40mm x 8g chipboard screws on a 400mm grid, and at no more than 100mm from sheet edges.
- Extend the laminate at least 200mm below ceiling level
- Once erected, protect the GIB Barrierline® and laminate from rain. The use of suitable sheeting can avoid delays in allowing the board to dry before wall linings are installed.
- If the specification calls for a 30 minute FRR a 10mm GIB Weatherline® laminate can be used.

SOUND CONTROL INFILL

Install Pink® Batts® R2.2 (90mm) glass wool insulation between the studs and nogs in both frames.

WALL LINING

A single layer of 13mm GIB® Standard fixed vertically or horizontally.

Use full height sheets where possible.

Sheet joints are touch fitted and must occur over framing. Where sheet end butt joints are unavoidable they must be formed over framing.

If the wall lining forms part of the structural bracing system, the lining type and fixings must comply with the published bracing system. Check requirements for specific bracing element hold-down connections.

FASTENING THE LINING

Fasteners

32mm x 6g GIB® Grabber® High Thread Drywall Screws.

Fastener centres

300mm centres to each stud, plate and sheet edge. Place screws no closer than 12mm from paperbound edges and 18mm from any sheet end or cut edges.

BUILDING SERVICE PENETRATIONS

GIB® Intertenancy Barrier Systems allow installation of plumbing and electrical services in the cavities either side of the central barrier. Back-to-back services and penetrations are permitted within the limitations given below. A minimum of 10 mm clearance must be provided between plumbing or electrical services and the central barrier.

Plumbing services up to 65 mm in diameter and electrical services up to 90 x 50 mm do not need specialist fire-stopping where they penetrate the wall linings. The maximum number of unprotected service penetration is limited to two per nominally 600 mm wide framing cavity. Plumbing service penetrations through wall linings must have neatly cut holes with 6 mm maximum clearance around the plumbing service. Fill the gap with a general purpose flexible sealant.

Suitable proprietary fire-stopping is required for wall lining penetrations larger than 90 x 50 mm or 65 mm in diameter, and for penetrations through the GIB Barrierline® core in the roof space.

Two way FRR – double timber frame with GIB Barrierline® central barrier

Specification number	Performance		Specifications	
GBTLAB 60d	**STC**	61	**Lining**	1 x 13mm GIB® Standard each side
	Rw	60	**LB/NLB**	Load bearing
	FRR	60/60/60	**Partition**	286–316mm wide

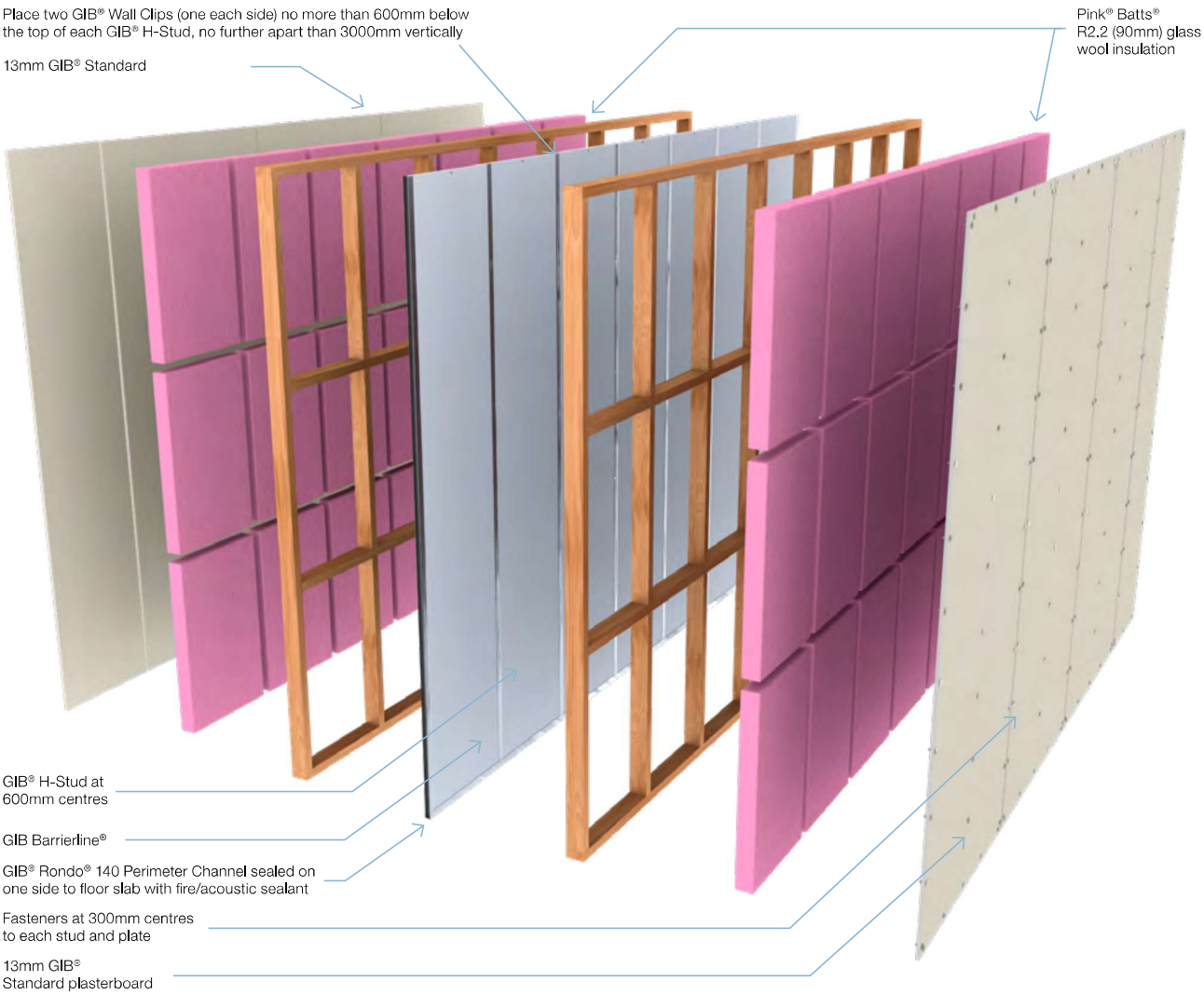
WET AREA WALL LINING

If the 13mm GIB® Standard wall lining is substituted with 13mm GIB Aqualine®, the FRR and noise control rating will be retained.

JOINTING

Central Barrier: Unstopped.
Roof Laminate Layer: Unstopped

Wall lining: All fastener heads stopped and all sheet joints tape reinforced and stopped in accordance with the publication entitled GIB® Site Guide. Wall to ceiling junctions are to be reinforced with paper tape and square stopped or finished with GIB-Cove®.



E2 Others

BRANZ Appraised

Appraisal No. 329 [2022]

THERMAKRAFT™ SUPERCOURSE 500 DAMP-PROOF COURSE AND CONCEALED FLASHING

Appraisal No. 329 (2022)

This Appraisal replaces BRANZ Appraisal No. 329 (2016)

Amended 29 August 2023

BRANZ Appraisals

Technical Assessments of products for building and construction.

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Product

1.1 Thermakraft™ Supercourse 500 is a single layer black polyethylene film, embossed on both faces to produce a small diamond pattern. It is for use as a general damp-proof course (DPC), and also as a concealed flashing for masonry veneer cladding.

Scope

2.1 Thermakraft™ Supercourse 500 has been appraised for use as a DPC for separating timber, wood-based products and metal from concrete, masonry or clay brick in accordance with NZS 3604.

2.2 Thermakraft™ Supercourse 500 has also been appraised for use as a DPC and flashing in masonry veneer walls in accordance with NZBC Acceptable Solution E2/AS1.

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, Thermakraft™ Supercourse 500 Damp-Proof Course and Concealed Flashing, if used, designed, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet, or contribute to meeting the following provisions of the NZBC:**

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years and B2.3.2. Thermakraft™ Supercourse 500 meets these requirements. See Paragraph 8.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2 and E2.3.3. When used as a flashing as part of a masonry veneer cladding system, Thermakraft™ Supercourse 500 contributes to meeting the requirements of E2.3.2. When used as a DPC, Thermakraft™ Supercourse 500 meets the requirements of E2.3.3. See Paragraphs 11.1 and 11.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Thermakraft™ Supercourse 500 meets this requirement.

Technical Specification

4.1 Thermakraft™ Supercourse 500 is a 0.5 mm thick, extruded polyethylene film. It consists of a single layer of black polyethylene, embossed on both faces to produce a small diamond pattern. The total thickness of the product after embossing is 0.75 mm. Thermakraft™ Supercourse 500 is supplied in rolls 30 m long and is available in widths of 50, 75, 90, 100, 150, 200, 250, 300, and 500 mm. Other widths are available upon request.

4.2 Each roll is labelled with the product name, dimensions, standards reference and manufacturer's information.

Handling and Storage

5.1 Handling and storage of the product, whether on-site or off-site, is under the control of the installer. The rolls must be protected from damage and weather and must be stored under cover, in clean, dry conditions.

Technical Literature

6.1 This Appraisal must be read in conjunction with:

- Installation Guide, Thermakraft™ Supercourse 500, Issue 4.0, dated September 2022.
- Product Data Sheet, Thermakraft™ Supercourse 500, Issue 7.0, dated August 2023.

6.2 All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

7.1 Thermakraft™ Supercourse 500 exceeds the vapour resistance requirements of NZBC Acceptable Solution E2/AS1, Table 23 for DPCs and is a suitable moisture impermeable alternative to bituminous DPCs.

7.2 Thermakraft™ Supercourse 500 is intended for use as a DPC separating timber, wood-based products and metal from concrete or masonry elements, or where required, timber jack studs or bearers from concrete or timber piles, e.g. where required by NZS 3604, Paragraph 2.3.3 and Figure 6.3. When used as a DPC, the roll width selected must enable the Thermakraft™ Supercourse 500 to extend at least 6 mm beyond each face of the timber in accordance with the requirements of NZS 3604, Paragraph 2.3.3 b).

7.3 Thermakraft™ Supercourse 500 is also intended for use as a flashing material with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.2.4 and also as a DPC in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.2.5.

Timber Treatment

7.4 Thermakraft™ Supercourse 500, when used as a DPC or flashing, is suitable for use in contact with timber treated with light organic solvent preservative (LOSP) or water-based timber preservatives. The solvent from the timber treatment must be allowed to evaporate (generally at least one week) prior to the installation of Thermakraft™ Supercourse 500.

Exposure Zone Fixing Selection

7.5 Where Thermakraft™ Supercourse 500 is used as a flashing behind masonry veneer, fixings shall be hot-dip galvanised clouts in NZS 3604 Exposure Zones B and C, and stainless steel clouts in Exposure Zone D.

Durability

Serviceable Life

8.1 Thermakraft™ Supercourse 500 is expected to have a serviceable life in excess of 50 years when it is installed in accordance with the requirements of this Appraisal and the Technical Literature, provided it is not exposed to the weather or ultraviolet (UV) light for a total of more than 30 days, and is never exposed to chemicals or solvents that will degrade polyethylene.

Control of Internal Fire and Smoke Spread

9.1 DPCs and flashings are exempt from the surface finish requirements of NZBC Acceptable Solutions C/AS1 and C/AS2 by NZBC Acceptable Solution C/AS1, Paragraph 4.3 e), and NZBC Acceptable Solution C/AS2, Paragraph 4.17.6 e).

Prevention of Fire Occurring

10.1 Separation or protection must be provided to Thermakraft™ Supercourse 500 from heat sources such as fireplaces, heating appliances, flues and chimneys. Part 7 of NZBC Verification Method C/VM1 and Acceptable Solution C/AS1, and NZBC Acceptable Solution C/AS2 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

11.1 Thermakraft™ Supercourse 500, when installed as a flashing in accordance with the Technical Literature and this Appraisal, will assist in the masonry veneer cladding system meeting the performance requirements of NZBC Clause E2.3.2.

11.2 Thermakraft™ Supercourse 500, when used as a DPC in accordance with the Technical Literature and this Appraisal, prevents walls, floors and structural elements in contact with the ground from absorbing or transmitting moisture in quantities that could cause undue dampness or damage to building elements to meet the performance requirements of NZBC Clause E2.3.3.

Installation Information

Installation Skill Level Requirement

12.1 All design and building work must be carried out in accordance with the Thermakraft™ Supercourse 500 Technical Literature and this Appraisal by competent and experienced tradespersons conversant with DPC and flashing installation. Where the work involves Restricted Building Work (RBW) this must be completed by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant License Class.

Installation

General

13.1 Rolls of Thermakraft™ Supercourse 500 may be cut to length with a sharp knife.

DPC Installation

13.2 The surfaces to be separated must be smooth and flat, free from projections such as small stones or sharp ridges that may puncture the membrane when pressure is applied.

13.3 When used to separate timber and wood-based products from concrete or masonry, Thermakraft™ Supercourse 500 should be temporarily held in place with small hot-dip galvanised clouts or zinc plated staples. The strip of DPC must be wide enough to fully protect the width of the material in contact with the concrete or masonry. Refer also to Paragraph 7.2.

13.4 When used under timber plates fixed over concrete floor slabs and foundation walls, a small slit should be made in the material before pushing down over the bolts or fixings. Alternatively, a small hole can be formed by gently tapping the product resting on top of the bolt until a puncture is formed.

Flashing Installation

13.5 Thermakraft™ Supercourse 500 must be fixed in place to framing members at maximum 300 mm centres with small hot-dip galvanised clouts.

13.6 Horizontal and vertical joints must be no less than 75 mm wide, with the direction of the lap ensuring that water is shed to the outer face of the flashing.

13.7 At the sill/jamb junction, the jamb flashing must overlap the sill flashing.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

14.1 The following tests have been carried out on Thermakraft™ Supercourse 500: water permeability, thickness, mass per unit area, pigment, impact resistance, and labelling, all in accordance with AS/NZS 2904 and AS/NZS 4347. The test results have been reviewed by BRANZ experts and found to be satisfactory.

Other Investigations

15.1 Durability and weathertightness opinions were given by BRANZ technical experts.

15.2 Site inspections have been carried out by BRANZ to assess the practicability of installation.

15.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

16.1 The manufacture of Thermakraft™ Supercourse 500 has not been examined by BRANZ, but details of the quality and composition of the materials used were obtained and found to be satisfactory. BRANZ undertakes an ongoing review of product quality on an inwards goods basis.

16.2 The quality of supply to the market is the responsibility of Kingspan Insulation NZ Limited.

16.3 Building designers are responsible for the design of the building, and for the incorporation of Thermakraft™ Supercourse 500 into their design in accordance with the instructions of Kingspan Insulation NZ Limited.

16.4 Quality of installation is the responsibility of the installer in accordance with the instructions of Kingspan Insulation NZ Limited.

Sources of Information

- AS/NZS 2904:1995 Damp-proof courses and flashings.
- AS/NZS 4347:1995 Damp-proof courses and flashings - Methods of test.
- NZS 3604:2011 Timber-framed buildings.
- NZS 4229:2013 Concrete masonry buildings not requiring specific engineering design.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

Amendments

Amendment No.1, dated 29 August 2023

This Appraisal has been amended to update the Appraisal Holder, to omit roll widths of 140, 400 and 1,000 mm, and to update the technical literature.

BRANZ

In the opinion of BRANZ, Thermakraft™ Supercourse 500 Damp-Proof Course and Concealed Flashing is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Kingspan Insulation NZ Limited, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
   a) relates only to the product as described herein;
   b) must be read, considered and used in full together with the Technical Literature;
   c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
   d) is copyright of BRANZ.
2. Kingspan Insulation NZ Limited:
   a) continues to have the product reviewed by BRANZ;
   b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
   c) abides by the BRANZ Appraisals Services Terms and Conditions;
   d) warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
   a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
   b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
   c) any guarantee or warranty offered by Kingspan Insulation NZ Limited.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to Kingspan Insulation NZ Limited or any third party.

For BRANZ

Chelydra Percy
Chief Executive

Date of Issue:
09 February 2022

INSTALLATION GUIDE

Thermakraft™ THERMATHENE BLACK

Thermakraft™ THERMATHENE BLACK

Damp Proof Membrane (DPM)

Thermathene Black is a concrete underlay that is made from a tear and puncture resistant polyethylene film. It is commonly known as a Damp Proof Membrane (DPM).

Product usage

Thermathene Black is used as a concrete underlay and a moisture vapour barrier in areas where protection is required. The product is 250 microns in thickness and is coloured black. Thermathene Black may also be used under suspended subfloors as ground protection from rising damp.

Kingspan®

Thermathene Black

Damp Proof Membrane (DPM)

Application Method

- Thermathene Black should be installed in accordance with the requirements of NZS3604:2011 and must be laid on a properly prepared base as required by NZS3604:2011 Section 7.5.3 to 7.5.6.2.
- Thermathene Black must be laid in a continuous manner with all laps minimum 150mm, and penetrations to be taped with Thermakraft White General Purpose Tape.
- Thermathene Black should be laid in a neat fashion with a smooth surface, with as many of the ripples as possible eliminated.
- Thermathene Black must be inspected for any damage (tears or pentrations) prior to concrete placement. Any damage must be repaired with Thermakraft White General Purpose Tape, for any larger damage a patch of Thermathene Black maintaining a 150mm lap.
- Thermathene must be installed by a licensed building practitioner.
- Thermathene Black may also be used to cover ground areas under suspended timber floors to prevent the rise of dampness. Ensure that the site is clear of rubbish, sharp edges such as rocks or bricks. Slit and patch around jack studs or pipe work. All penetrations and joints must be taped.

Handling and Storage

Thermathene Black must be handled with care to prevent damage, the product must be stored under cover well away from direct moisture, rainfall contact and sunlight (UV). Care should be taken not stack other materials on top of the product.

0800 806 595
www.thermakraft.co.nz

Thermakraft and Ausmesh products are brought to you by Kingspan Insulation NZ Limited.

Issue 2.0, September 2022

INSTALLATION GUIDE

Thermakraft™ WATERGATE Plus

Thermakraft™ ONE WRAP SYSTEM

10 Products - One system
One warranty

Thermakraft™ WATERGATE PLUS

New Zealand's all-purpose, fire retardant wall underlay.

Watergate Plus is specifically designed as a wall underlay for use behind exterior wall cladding. Made from synthetic materials Watergate Plus is fire retardant, water resistant and vapour permeable. The water vapour transfer rate of the product has been optimised to minimise condensation risk in homes without compromising its primary water barrier properties.

Watergate Plus is part of the Thermakraft One Wrap System. Its unique construction allows for easier installation while maintaining performance qualities.
Watergate Plus can only be used in lined applications. Section E2 of the New Zealand Building Code defines lining as "the rigid sheet covering for a wall, ceiling or other interior surface."

BRANZ Appraised
Appraisal No. 695

CodeMark
CMNZ10002

Kingspan®

Watergate Plus
Synthetic Wall Underlay

Can only be used in lined applications. Section E2 of the New Zealand Building Code defines lining as "the rigid sheet covering for a wall, ceiling or other interior surface."

Application Method

- Fix Watergate Plus underlay with printed side facing the exterior and run horizontally.
- Fix to all exterior walls from below bearers to the top plate. Watergate Plus underlay is available in widths of 2740mm and 1370mm. The 2740mm width product is generally wide enough to cover from below the bottom plate to the top plate.
- **Timber Framing:** Pull the Watergate Plus underlay tight and fix securely to the frame with fasteners such as galvanized Little Grippers, 6mm-8mm staples or 20mm large head galvanized clouts at 300mm centres horizontally and vertically.
- **Steel Framing:** Ensure frame is free from oil, dust and dirt. Fix securely using construction grade double-sided tape or adhesive or galvanized flat head screws that are appropriate for external framing and roofing use, at 300mm centres.
  Note: Check adhesive compatibility with Watergate Plus and the steel framing materials before use.
  If using a tape: Apply double-sided tape onto steel frame studs and only peel off the forward-facing liner once Watergate Plus is ready to be installed. When ready, peel off approximately 2m of tape liner at a time and press Watergate Plus firmly onto tape, ensuring it is taut. **Note:** The double-sided tape is to temporarily hold the Watergate Plus in place until the batten and/or cladding is installed. The screws used to fix these are the permanent fixings for Watergate Plus.
- Minimum of 150mm lap is required at joins. All vertical laps must be made over studs. Horizontal laps to be laid ship lap style allowing water to be shed to the outer face of Watergate Plus.
- Cover all windows and door openings with Watergate Plus underlay. It is recommended that the Watergate Plus underlay is not cut and prepared for window installation until the arrival of the windows.
- When windows and doors are ready for installation, the Watergate Plus underlay covering the openings should be cut at 45° and folded into the opening and securely fastened. Thermakraft window flashing tapes are recommended as the window flashing system.
  Note: In accordance with NZBC Acceptable Solution E2/AS1 and NASH Building Envelope Solutions: 2019 (E2/AS4), wall underlay must be prevented from bulging into the drained cavity. Where stud spacing is greater than 450mm, Thermakraft Stud Strap or Thermastrap run horizontally at 300 centres is an acceptable means of prevention.
- Once installed, Watergate Plus must not be left exposed to the weather or UV for more than 90 days. Watergate Plus underlays will provide temporary weather protection during construction allowing work to continue. Internal linings and insulation must not be installed until the exterior cladding is completed.
- Fastenings behind Brick Veneer Cladding must have an equivalent service life to that of Brick Veneer (50 years). Refer to NZBC B2 Durability.
- Repair small damaged areas with any Thermakraft window flashing tape or Thermakraft Premium Joining Tape. Any large areas which require repair may be covered with a second layer of underlay with a lap of 150mm and then taping.
- Watergate Plus underlay must be installed by, or under the guidance of a licensed building practitioner.

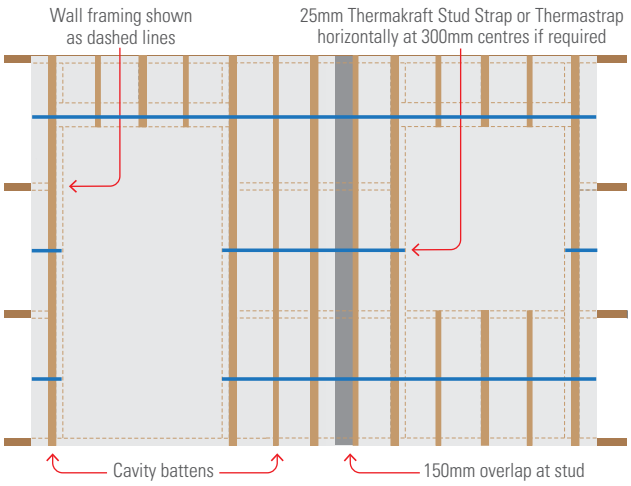
Fix Watergate Plus securely to the frame.

On arrival of doors and windows, cut Watergate at each opening on a 45° angle away from each corner. Pull the Watergate flaps inside and fasten to the inside of frame.

Watergate Plus
Synthetic Wall Underlay

Application Tips

Watergate Plus is unaffected by LOSP or other solvent based treated timber. However, LOSP or other solvent based treated timber must have sufficient time for the solvent to flash off in a well-ventilated area. Recommended minimum 7 days.



Handling and Storage

Watergate Plus underlay must be handled with care to prevent damage such as tearing and roll deformation. Due to the width of the product, care should be taken when installing in windy conditions.

The product must be stored under cover well away from direct moisture, rainfall contact and sunlight (UV). Care should be taken not stack other materials on top of the product.

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Issue 7.0, May 2025

H1 & Insulation

H1 Compliance

The existing 1960s semi detached State House which comprises 16 & 18 Kitchener Place is a timber framed house typical of the era with timber framed suspended floor, masonry intertenancy wall and hipped roof, originally clad in tiles but replaced recently in metal cladding.
The original building had no insulation in the walls or ceiling; while owned by Housing NZ polyester ceiling insulation has been installed.

The works to the external envelope of the building are minimal, being predominantly removal of existing, and rebuilding of new, internal partitions.

Thermal performance has been upgraded where possible within these limitations.

In enclosing the original rear porches to create laundries, the floor has been built up to match the main house floor with 50mm XPS insulation laid over the original concrete slab. The external walls and ceiling where able to be relined have R2.6 batts installed to the cavities.

The intention is to add batts to any existing wall cavities where possible, if internal linings are replaced, but the full extent is not known until work commences.

New double glazed aluminium framed glazed doors will be installed to the living areas of both units. This is an improvement on the existing single glazed timber windows.

Conclusion:
The thermal envelope of the existing residence is significantly improved where works are being carried out, within the limitations of the scope of work.