



WAIMAKARIRI
DISTRICT COUNCIL

Consent Issued BC171675

BC No: 171675

SITE DETAILS:

5 CATCHPOLE PLACE

WOODEND

LEGAL:

LOT 20 DP 500690

Heating Units **must not** be lit
until the Code Compliance
Certificate is issued

**APPROVED BUILDING CONSENT DOCUMENTS AND PLANS
(FULL SET SUPPLIED)**

- ON SITE COPY -

- These plans and specifications must be kept on site during construction, and made available to the building officer on request. Failure to do so will mean an automatic failure of the building inspection and will necessitate re-booking the inspection at the applicant's expense.
- All boundary survey pegs must be located and flagged by the owner before work is commenced.

INSPECTIONS

for bookings or building enquiries

please phone the BUILDING UNIT on:

03 311 8906

or

Email inspection bookings to: bcbooking@wmk.govt.nz

- Please refer to your inspection schedule for details of inspections to be carried out.
- 2-3 working day's notice should be given and provision made to allow access.
- The Code Compliance Certificate will be issued once the:
 - Final inspection has been carried out and passed
 - Audit of WDC building consent file has been completed
 - Payment of any outstanding invoices is received

Dial Before You Dig

Safety near underground cables and services

MainPower is committed to providing a safe, secure and reliable electricity supply to all customers.

This fact sheet is designed to inform you about safety around electricity, particularly underground cables.

Working near electricity cables

Serious personal injury can result from damaging underground services during excavation and ground penetration. Supply disruption and repairs can be costly and extremely irritating to customers.

The positions where cables are buried are subject to reasonable tolerance however, the depth of cover may have changed since installation.

It is your responsibility to verify the position and depth of cables before excavation.

Steps to ensure safe digging

- Obtain up-to-date plans from the relevant local authorities.
- Use a cable locator, if possible, to mark-out the underground services before commencing work.
- Practice safe digging procedures.
- The Worksafe Guide for Safety with Underground Services sets out agreed work methods and preferred work practices for the location and excavation of underground services. Download the guide at - <http://www.business.govt.nz/worksafe/information-guidance/all-guidance-items/underground-services-guide-for-safety-with/underground.pdf>

Underground electricity cables

For copies of plans showing MainPower's electricity cables phone 03 311 8300, weekdays 8am - 5pm or email us at underground.records@mainpower.co.nz.

Please allow 2 working days to receive copies of plans. MainPower may hold some records of privately-owned cables connected to the MainPower network system; contact MainPower in the first instance.

Additional services MainPower can provide if you are planning your digging:

- Mark-out Services: MainPower can trace cables using an electronic locator.
- On-Site Supervision: For difficult work or locations, MainPower can provide on-site safety supervision.

Disclaimer This fact sheet is not an exhaustive list of all safety matters that need to be considered. Whilst care is taken in the preparation of this material, MainPower does not guarantee the accuracy and completeness of the information.

Underground council services

All contractors are reminded of their legal responsibility to take all practicable steps to locate and protect existing services. In the road corridor, service plans and a Corridor Access Request (CAR) permit need to be obtained through the Beforeudig website (www.beforeudig.co.nz). The Beforeudig service helps contractors to determine the location of any underground services before excavating. For service plans on private property, and lateral locations for work on private property that will not extend into any part of the road reserve, contact the Waimakariri District Council's Customer Services team at office@wmk.govt.nz.

Contact MainPower

To report a fault:
0508 60 70 80

For electricity emergencies:
0508 60 70 80

For general enquiries:
www.mainpower.co.nz
info@mainpower.co.nz
03 311 8300 (8am to 5pm, Monday to Friday)



mainpower

Dial before you dig.

Always remember to locate underground cables and services before digging and avoid serious injury, supply disruption and costly repairs. Phone MainPower for cable location advice.

03 311 8300

Think for Safety's Sake

www.mainpower.co.nz

DWELLING & OTHER WORKS - NOT COMMERCIAL

SECTION 1

Statutory Forms

- **Inspection List – By Council**
- **Building Consent Form (Form 5) – By Council**
- **Code Compliance Application (Form 6) – By Council**
- **Installation & PS3 Forms – By Council**
- **Application Form**
- **LBP Design Certificates**
- **Certificate of Title or Sales & Purchase Agreement**
- **PIM, Resource Consent – By Council**

PLEASE NOTE

- Although your Consent documentation states 48 hours notice is required, it is not always possible to carry out an inspection within this period.
- If an inspection of the building works is not carried out in accordance with the Inspection Schedule it could affect the issue of the Code Compliance Certificate.

To book inspections ring WDC on
03 311 8906

All inspections are subject to a separate charge.

All re-inspections will be charged and recorded separately even if other inspections are carried out on the same day.

Using engineers & other professionals

If an engineer has been engaged to carry out various site inspections you will need to provide copies of his/her site notices to us and a producer statement, a PS4 from the engineer confirming the building elements designed and inspected by the engineer were completed in accordance with the approved design.

Confirmation of installation of products

We require producer statements, warranties & installation certificates from various installers as a way of confirming products have been installed in accordance with the manufacturer's recommendations. These are commonly required for exterior claddings, wet area tanking, membrane roofing/decking and effluent fields. Energy certificates such as electrical and gas certificates need to be provided too. You will need to provide these to us prior to the issue of the Code Compliance Certificate.

Applying for a Code Compliance Certificate (CCC)

When you are satisfied your project is complete please book a final inspection and complete and sign *form 6*, application for Code Compliance Certificate which is enclosed with your building consent. You should have this form ready for when the building Inspector arrives on site to carry out the final inspection. Please note all outstanding monies must be paid prior to the issue of the CCC.

Grant or refuse a CCC

We are required to make a decision to grant or refuse a CCC if you do not formally apply for a CCC within two years of the granting of the building consent. The date your consent was granted is the date at the bottom of the building consent form. If you do not apply for a CCC or arrange an extension with us within the two year period we may carry out an inspection of the building work. An additional fee applies for this work.

Lapsing of your consent

Your building consent will lapse if building work has not commenced within 12 months after the date of issue of the building consent. The issue date is deemed to be the day you paid for the consent. In saying this we understand things don't always run smoothly so you can apply for a time extension which we may agree to. A fee applies for this.

Site Inspection Sheet

Application

Ruqiah H Foote, James Foote, C/- GJ Gardner Homes PO Box 21-382 Edgeware Christchurch	No.	BC171675
	Issue date	15 November 2017
	Overseer	Nicola McAnulty

Project

Description	1100 New (& prebuilt) House, Unit, Bach, Crib, Town Houses BC - New or Relocated Dwelling, New Detached Dwelling, 01 Standard Building Consent(20 W Processing Days)
Intended Life	Indefinite (50+)
Intended Use	Residential dwelling
Estimated Value	\$326393.00
Location	5 Catchpole Place WOODEND
Legal Description	LOT 20 DP 500690 0.062500 Ha
Valuation No.	2161105720

This inspection list and all the approved plans relating to this building consent are to be kept on site and available to the building and/or plumbing and drainage inspector, or approved building certifier, on request.

Please give at least 48 hours notice for the next required inspection.

Work cannot proceed past each step until that step has been inspected and approved.

Please note! The approved plans and this inspection sheet are to be available on site, on request, at all times.

All inspections listed below are to be inspected by a WDC Building Inspector, an Engineer may also need to be engaged to inspect engineer requirements, this will be noted below.

BC171675 *Main BC*
Building Name:
Location within Site:
Level/Unit Number:
Compacted Hardfill - pre DPM - Engineer to also inspect
Foundation / Floor Slab - Engineer to also inspect
Structure Pre Roof Pre Wrap -
Building Wrap & Sill Tape -
Cavity Battens & Flashings - Axon Panel
Mid Height Veneer -
Drains -
Preline & Plumbing -
Prestopping -
Final -

Form 5

Building consent BC171675

Section 51, Building Act 2004

The building

Street address of building: 5 Catchpole Place WOODEND

Legal description of land where building is located: LOT 20 DP 500690 0.062500 Ha

Valuation number: 2161105720

Building name:

Location of building within site/block number:

Level/unit number: 1

The owner

Name of owner: James Foote and Ruqiah H Foote

Contact person: James Foote

Mailing address: 23 Grahams Road Christchurch 8041

Street address/registered office:

Phone number: Landline:

Mobile: 0221377007

Daytime:

After hours:

Facsimile number:

Email address:

Website:

First point of contact for communications with the council/building consent authority:
GJ Gardner Homes

Building work

The following building work is authorised by this building consent:

DWELLING WITH ATTACHED GARAGE 5 CATCHPOLE PLACE WOODEND LOT 20 DP 500690

New (& prebuilt) House, Unit, Bach, Crib, Town Houses

Housing - Detached dwellings

This building consent is issued under section 51 of the Building Act 2004. This building consent does not relieve the owner of the building (or proposed building) of any duty or responsibility under any other Act relating to or affecting the building (or proposed building).

This building consent also does not permit the construction, alteration, demolition, or removal of the building (or proposed building) if that construction, alteration, demolition, or removal would be in breach of any other Act.

This building consent is subject to the following condition:

The Building Act 2004, s90, states that agents authorised by the building consent authority (the Council) for the purposes of this section are entitled, at all times during normal working hours or while building work is being done, to inspect –

- (a) land on which building work is being or is proposed to be carried out; and
- (b) building work that has been or is being carried out on or off the building site; and
- (c) any building.

This building consent is issued with the following advice notes:

Please note that any material deviation from the approved documents will require a formal application for amendment. Amendments that are not of a material nature can be approved by a Building Officer or Building Inspector by way of the endorsement of the approved consent documentation.

The certifying drainlayer's registration number shall be provided to the Building Consent Authority prior to issue of the Code Compliance Certificate.

Comply with the endorsements on the plan.

The electrical certificate shall be provided to the building consent authority prior to issue of Code Compliance Certificate

Licensed building practitioners records of work shall be provided to the building consent authority for foundations, carpentry / primary structure, roof cladding, wall cladding systems, brick & block laying as applicable at the conclusion of the relevant work.

Please note the consent has been granted prior to confirmation of who the Licensed Building Practitioners are for the job. The Building Consent Authority will not book nor carry out an inspection until the names and licence number(s) of the Licensed Building Practitioner(s) have been provided in writing.

The duplicate copy of the approved consent documents and inspection schedule must remain on site during construction.

The plumbing pressure test PS3 & plumbers registration number shall be provided to the Building Consent Authority prior to issue of the Code Compliance Certificate

A PS4 construction review will be required from the engineer prior to the issue of a Code Compliance Certificate.

Occupational Health and Safety and the Labour Department to be notified prior to any disturbance of asbestos or hazardous materials on site during demolition or construction.

A Building Consent lapses and is of no effect if the building work to which it relates does not commence within 12 months after the date of issue of the building consent or any further period that the Building Consent Authority may allow. (Time extensions to commence building work after 12 months must be submitted to the Building Consent Authority in writing stating the reason for the request, prior to the lapse date of the consent.

A Building Consent is not completed until it has been issued with a Code Compliance Certificate. The owner is required to complete a separate application for a Code Compliance Certificate as soon as practicable after the building work is completed. In any event no later than two (2) years after the granting of the Building Consent. Council is required to decide whether or not a Code Compliance Certificate can be issued. If your project will not be completed within two years you will need to apply for a time extension*. *fees apply

Engineers site reports are to be kept on site for the review and collection by the building Inspector.

All boundary survey pegs must be located by discovery or redefinition before work is commenced.

Your consent is issued subject to manufactures technical information about their products, installation and maintenance is to be as this technical information requires.

The installer shall provide the building consent authority a PS3 for the installation of the Internal wet area

membrane to bath plinth, prior to issue of Code Compliance Certificate.

Compliance schedule

A Compliance Schedule is not required for this building.

Attachments

Copies of the following documents are attached to this building consent:

Consented Plans

Consented Specifications

Inspection List

Form 6 Application for Code Compliance

A handwritten signature in blue ink, appearing to read 'Shirley Cresswell', with a long horizontal stroke extending to the right.

Shirley Cresswell
Building Unit administrator

On behalf of: Waimakariri District Council
Date: 15 November 2017

Form 6

Application for code compliance certificate

Section 92, Building Act 2004

The building consent

Building consent number: BC171675

Issued by: Waimakariri District Council

Valuation number: 2161105720

The owner

Name of owner: James Foote & Ruqiah H Foote

Contact person: James Foote

Mailing address: 23 Grahams Road Christchurch 8041

Street address/registered office:

Phone number: Landline:

Mobile: 0221377007

Daytime:

After hours:

Facsimile number:

Email address:

Website:

The following evidence of ownership is attached to this application: RCNotReq

Agent

Name of agent: GJ Gardner Homes

Contact person: Penny Wade

Mailing address: PO Box 21-382 Edgeware Christchurch

Street address/registered office:

Phone number: Landline:033239154

Mobile:

Daytime:

After hours:033239154

Facsimile number:

Email address: penny.wade@gjgardner.co.nz

Website:

Relationship to owner:

Application

All building work to be carried out under the above building consent was completed on:

The personnel who carried out the building work are as follows:

The following specified systems are contained on the compliance schedule for the building and, in the opinion of the personnel who installed them, are capable of performing to the performance standards set out in the building consent:

I request that you issue a code compliance certificate for this work under section 95 of the Building Act 2004.

The code compliance certificate should be sent to:

Applicant: 23 Grahams Road Christchurch 8041

4A Hudson Street Christchurch 8053

Agent: PO Box 21-382 Edgware Christchurch

Signature of agent on behalf of and with the
authority of the owner

Name of person signing

Date:

Attachments

The following documents are attached to this application:

¶Certificates from the personnel who carried out the work

¶Certificates that relate to the energy work



Private Bag 1005, Rangiora 7440
Ph 03 311 8900, 03 327 6834 Fax 03 313 4432
www.waimakariri.govt.nz

BC No.

Issued by (Plumber):

At (address):

For (Owner):

In respect of the testing of water pipe work prior
to concealment.

I hereby state that I have personally tested the water pipe work installed in the building authorised under this Building Consent by the method indicated hereunder.

- ☐ By pressurising the pipe work to 1500 kPa for a period of not less than 15 minutes for the hot and cold water supply and checking to see there are no leaks. (NZBC G12/AS1 7.5.1 (a), (b).)
- ☐ By pressurising the uPVC pipe work to 1.5 times the maximum working pressure for a period of not less than 15 minutes and checking that there are no leaks. (NZBC G12/AS1 7.5.2, NZS 7643).

Max working pressure was:

- ☐ By pressurising the pipe work to 1500 kPa for a period of not less than 5 minutes and checking to see there are no leaks. (NZBC G12 VM1, AS3500:Part 1.2 1998)

And believe on reasonable grounds that the pipe work has passed that test.

- ☐ All work complies with the NZBC

I also understand that Waimakariri District Council in accepting this producer statement will be relying on it to issue the Code Compliance Certificate at the completion of the building work.

SIGNATURE OF LICENSED CERTIFYING PLUMBER:

Signature:

Registration Number:

Company Name:

Date:



THE BUILDING

1. Site address:
(Street / Road / Township)
2. Legal description of the land where the building is located:
Lot: DP: Valuation Number:
3. Building Name (if applicable):
4. Location of building within site:
(Only applicable to multi-development sites)
5. Number of levels: 6. Unit/Level No.:
7. Floor area m² - Existing: New: Total:
8. Current lawfully established use:
(i.e. use on any previous consent for the existing building)
9. Year building first constructed:
(Only applicable to existing buildings, approximate date is acceptable, eg 1920's)

THE OWNER

10. Owner's name:
(Company or organisation name if applicable)
11. Contact person:
12. Mailing address:
13. Street address / Registered office:
14. Mobile: Landline: Email:
15. The following evidence of ownership is attached to this application:
☐ Copy of Certificate of Title OR ☐ Council to provide (additional charge of \$15)
(Current within 1 month)
☐ Signed copy of Sale and Purchase Agreement
(If Certificate of Title is not issued)

THE AGENT

PLEASE NOTE - Authorisation is required from the owner to act as agent.

16. Agent's name:
(Company or Organisation name if applicable)
17. Contact person:
18. Mailing address:
19. Street address / Registered office:
20. Mobile: Landline: Email:

APPLICATION

21. I request that the following (please select one) be issued for the Building Work described in this Application:

- | | |
|--|--|
| <input type="checkbox"/> Project Information Memorandum (PIM) only | <input type="checkbox"/> Building Consent for PIM No: <input type="text"/> |
| <input type="checkbox"/> Building Consent with PIM | <input type="checkbox"/> Building Consent without PIM (Planning Check applies) |
| <input type="checkbox"/> Exemption from the need for B/C
(Refer Schedule 1, Part 1, Section 2, BAA13) | <input type="checkbox"/> Amendment to Building Consent |

22. I wish to receive my approved documentation in the following format:

PLEASE NOTE - If CD or Hard Copy please confirm if you wish to pick it up from the council or have it posted/couriered (couriered will incur an additional cost).

- ☐ Electronically via Sharefile Transfer Portal ⁽¹⁾
- ☐ CD: ☐ (post) OR ☐ (pick-up) OR ☐ (courier)
- ☐ Hard copy: ☐ (post) OR ☐ (pick-up) OR ☐ (courier)

23. All consent related invoices/refunds to be billed and sent to:

- ☐ Owner ☐ Agent ☐ Or other (If other please complete below)

Company name:

(If applicable)

Contact person:

Mailing address:

Mobile:

Landline:

Email:

PLEASE NOTE - Any refunds are to the receipted name unless written authorisation has been received from the receipted person or company.

24. Please also provide:

- ☐ Additional On-site copy
- ☐ Weather tight storage box⁽²⁾

(1) You must be set up and registered for this option.

(2) The council can supply a weather tight storage box for a cost (must be picked up from the Council).

PLEASE NOTE - One set of "On-site" hard copy consented documents must be available at all times for inspections.

If the applicant chooses to print their own "On-site" copy of documents it must be a full set, to scale and legible.

If there are non-consented documents on-site this will result in a failed inspection.

PROJECT

Consent Issued BC171675

BC171675

25. Description of work (e.g. dwelling, alteration/addition)

26. Specify the intended use of the building (e.g. residential)

27. Will the building work result in a change of use of this building? ☐ Yes ☐ No

If yes provide details

28. Will hazardous substances be stored in the building? ☐ Yes ☐ No

29. Intended life of the building:

Indefinite but not less than 50 years ☐ Or specified as years

30. Is this a staged consent: ☐ Yes ☐ No

If staged, provide details

(e.g. Stage 1 of 3)

31. List Building Consents previously issued for this building (if any):

(i.e. is this project being constructed in stages? Is this consent for a relocated or transportable building?)

32. Estimated value (incl GST) \$

(i.e. the estimated aggregate of the values of all goods and services to be supplied for the building work and includes GST).

GEOTECHNICAL REPORT

If a geotechnical report has been included in this application, please confirm that it has been uploaded to the Canterbury Geotechnical database by providing its unique report reference number below.

Report number:

PROJECT INFORMATION MEMORANDUM

The following matters are involved in the project:

- ☐ Subdivision
- ☐ Alterations to land contours
- ☐ New or altered connections to public utilities
- ☐ New or altered locations and/or external dimensions of buildings
- ☐ New or altered access for vehicles
- ☐ Building work over or adjacent to any road or public place
- ☐ Disposal of stormwater and wastewater
- ☐ Building work over any existing drains or sewers or in close proximity to wells or water mains
- ☐ Other matters known to the applicant that may require authorisations from the territorial authority:

NOTES

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Other notes or comments which you may wish to add, eg: Resource Consents

BUILDING CODE COMPLIANCE

The building work will comply with the building code as follows:

(If you are not sure what clauses are applicable, consult with your builder, designer or architect)

Building Consent 171675
Received 10/11/17

Clause (Tick relevant clause numbers of Building Code)	Means of compliance (Refer to the relevant compliance document(s) or detail of alternative solution in the plans and specifications; if not applicable, put n/a)	Waiver / modification required (State nature of waiver or modification of building code required; if not applicable, put n/a)
<input type="checkbox"/> B1 Structure		
<input type="checkbox"/> B2 Durability		
<input type="checkbox"/> C1 - C6 Protection from fire		
<input type="checkbox"/> D1 Access routes		
<input type="checkbox"/> D2 Mechanical installations for access		
<input type="checkbox"/> E1 Surface water		
<input type="checkbox"/> E2 External moisture		
<input type="checkbox"/> E3 Internal moisture		
<input type="checkbox"/> F1 Hazardous agents on site		
<input type="checkbox"/> F2 Hazardous building materials		
<input type="checkbox"/> F3 Hazardous substances and processes		
<input type="checkbox"/> F4 Safety from falling		
<input type="checkbox"/> F5 Construction and demolition hazards		
<input type="checkbox"/> F6 Visibility in escape routes		
<input type="checkbox"/> F7 Warning systems		
<input type="checkbox"/> F8 Signs		
<input type="checkbox"/> F9 Means of restricting access to residential pools		
<input type="checkbox"/> G1 Personal hygiene		
<input type="checkbox"/> G2 Laundering		
<input type="checkbox"/> G3 Food preparation and prevention of contamination		
<input type="checkbox"/> G4 Ventilation		
<input type="checkbox"/> G5 Interior environment		
<input type="checkbox"/> G6 Airborne and impact sound		
<input type="checkbox"/> G7 Natural light		
<input type="checkbox"/> G8 Artificial light		
<input type="checkbox"/> G9 Electricity		
<input type="checkbox"/> G10 Piped services		
<input type="checkbox"/> G11 Gas as an energy source		
<input type="checkbox"/> G12 Water supplies		
<input type="checkbox"/> G13 Foul water		
<input type="checkbox"/> G14 Industrial liquid waste		
<input type="checkbox"/> G15 Solid waste		
<input type="checkbox"/> H1 Energy efficiency		

COMPLIANCE SCHEDULE

Consent Issued BC171675

The specified systems for the building are as follows (specified systems are defined in regulations):

The following specified systems are being altered, added to, or removed in the course of the building work:

There are no specified systems in the building ☐

RESTRICTED BUILDING WORK

Does the building work include any restricted building work? ☐ Yes ☐ No

If Yes, provide the following details of all Licensed Building Practitioners who will be involved in carrying out or supervising the restricted building work (if these details are unknown at the time of the application, they must be supplied before the work begins).

LICENCE CLASS	NAME	LICENSED BUILDING PRACTITIONER NUMBER (or registration number if treated as being licensed under section 291 of the Building Act 2004)
FOUNDATIONS		
CARPENTRY		
EXTERIOR PLASTERER		
BRICKLAYER		
BLOCKLAYER		
ROOFER		

KEY PERSONNEL**BUILDER**

Name:	<input type="text"/>	Reg. No.:	<input type="text"/>
Address:	<input type="text"/>		
Phone No.:	<input type="text"/>	Fax No.:	<input type="text"/>
Email:	<input type="text"/>		

DESIGNER(S)

Name:	<input type="text"/>	Reg. No.:	<input type="text"/>
Address:	<input type="text"/>		
Phone No.:	<input type="text"/>	Fax No.:	<input type="text"/>
Email:	<input type="text"/>		

CERTIFYING DRAINLAYER

Name:	<input type="text"/>	Reg. No.:	<input type="text"/>
Address:	<input type="text"/>		
Phone No.:	<input type="text"/>	Fax No.:	<input type="text"/>
Email:	<input type="text"/>		

CERTIFYING PLUMBER

Name:	<input type="text"/>	Reg. No.:	<input type="text"/>
Address:	<input type="text"/>		
Phone No.:	<input type="text"/>	Fax No.:	<input type="text"/>
Email:	<input type="text"/>		

CERTIFYING GASFITTER

Name:	<input type="text"/>	Reg. No.:	<input type="text"/>
Address:	<input type="text"/>		
Phone No.:	<input type="text"/>	Fax No.:	<input type="text"/>
Email:	<input type="text"/>		

REGISTERED ELECTRICIAN

Name:	<input type="text"/>	Reg. No.:	<input type="text"/>
Address:	<input type="text"/>		
Phone No.:	<input type="text"/>	Fax No.:	<input type="text"/>
Email:	<input type="text"/>		

STRUCTURAL ENGINEER

Name:	<input type="text"/>	Reg. No.:	<input type="text"/>
Address:	<input type="text"/>		
Phone No.:	<input type="text"/>	Fax No.:	<input type="text"/>
Email:	<input type="text"/>		

OWNER / AGENT AUTHORISATION

PLEASE NOTE - By entering your name in the box below you are giving your authority for the application to proceed.

Name:

Date:

I am the ☐ Owner ☐ Agent

Note: If acting on behalf, by entering your name above you hereby declare that you are authorised to act as Agent for the Owner.

NB: Ensure Agent Authorisation section is completed - see below.

AGENT AUTHORISATION (TO BE AUTHORISED BY OWNER)

PLEASE NOTE - By entering your name in the box below you are giving your authority for this application to proceed.

I authorise to act as Agent on my behalf for this Building Consent application under Sections 33 and 45 of the Building Act 2004.

With respect to this Building Consent application, I authorise to act as Agent on my behalf for the application for Code Compliance Certificate under Section 92 of the Building Act 2004.

Name (Owner):

Date:

TERMS OF TRADE

I/We understand that:

Building Consents shall be paid for when the consent is collected or if the consent is not collected within three months after the date of consent being granted, the work done to date portion i.e. admin and processing costs of the account will be due and payable. The balance of the invoice will be payable when the consent is collected.

All other accounts shall be paid by the 20th day of the month following the month in which the invoice is issued.

I/We agree to pay according to these terms for any goods or services you supply to us. Failure to meet these Terms of Trade may result in any credit arrangement being withdrawn with any balance becoming payable within seven days. Should failure to meet the terms of trade result in debt recovery and/or legal proceedings, any costs whatsoever incurred in the collection of the debt including debt collector's fees and commissions and legal costs, charges and expenses on a solicitor and own client basis will be added to the account and will be payable by me/us.

DOCUMENTATION CHECKLIST

Applicants must mark all items provided with ☒ or leave blank if not applicable.

PIM

This section must be completed if you are applying for a PIM.

DO NOT complete this section if a PIM has already been issued.

The following documents are attached to this application:

- ☐ Site plan, Floor plans, Elevations for proposed building
- ☐ Certificate of Title, or Sales and Purchase Agreement if C/T is not issued. Current C/T required (issued within one month of application)
- ☐ One copy of all information required (all plans to be dimensioned, scaled and accurate. Plans preferred size A3)
- ☐ Application fee (as per Council Fees and Charges Schedule)

BUILDING CONSENT

(DO NOT complete this section if the Application is for a Project Information Memorandum only)

The following documents are attached to this application:

- ☐ 1 copy - building plans (site plans, floor plans, elevation plans. All plans to be dimensioned, scaled and accurate preferred size A3)
- ☐ 1 copy of each - specifications, producer statements, truss details (refer below)
- ☐ 1 copy -Certificate of Title or Sale and Purchase Agreement if C/T is not issued. Current C/T required (issued within one month of application)
- ☐ Project Information Memorandum Development Contribution Notice (if applicable)
- ☐ Certificate attached to Project Information Memorandum (Resource Management Act)
- ☐ Certificate of design work from licensed building practitioner
- ☐ Restricted building work - see page 5
- ☐ Key personnel - see page 6
- ☐ See page 4 for a schedule confirming the building work will comply with the Building Code

APPLICATION FORM (One copy)**Consent Issued BC171675**

BC171675

**OFFICE
USE ONLY**These have
been provided:

- ☐ Fully complete all sections
- ☐ Means of Compliance with NZBC - designer to complete
- ☐ Provide the correct legal description (Council can help with this)
- ☐ Provide one copy of the current Certificate of Title, or Sales and Purchase Agreement - not more than one month old
- ☐ Give name and contact numbers of contact person (if not the owner)
- ☐ State the project location (street address or location details as near as possible if no address)
- ☐ Sign and date the form
- ☐ Agent Authorisation (section completed where applicable)
- ☐ Certificate/s of design work (LBP)

DESIGN BASIS (To be completed by the designer)

Please list the following basis for the building design:

- ☐ Wind zone
- ☐ Earthquake zone
- ☐ Snow zone/altitude
- ☐ Corrosion zone (if applicable)
- ☐ Building is specifically engineer-designed
- ☐ Complies with NZS 3604:2011
- ☐ Both specific design and NZS 3604:2011

DESIGN DOCUMENTS (One copy)

- ☐ Weather tightness risk matrix
- ☐ Truss design layout and Producer Statement
- ☐ Bracing calculations / plan
- ☐ H1 Energy efficiency calculations

SITE PLAN (One copy)

- ☐ Overview of site showing legal boundaries as per current Title
- ☐ Showing proposed and existing structures (including swimming pools)
- ☐ Distances to boundaries
- ☐ Proposed and existing site levels
- ☐ North point
- ☐ Utility infrastructure (sewer, water pipelines, septic tanks etc) where applicable
- ☐ Water races, drains, topographic features

DRAINAGE LAYOUT (One copy to scale usually 1:100 or 1:50)

- ☐ Foul water - showing waste pipes, sizes, grades, venting
- ☐ Foul water to discharge point
- ☐ Storm water - pipe sizes, grades, downpipe locations
- ☐ Storm water drain to discharge point

FOUNDATION LAYOUT (One copy to scale usually 1:100 or 1:50)

- ☐ Full foundation layout plan
- ☐ For timber floors, show all pile layout, pile types and bracing location
- ☐ Slab thickenings, shrinkage control joints and reinforcing rebates

**OFFICE
USE ONLY**These have
been provided:**FLOOR PLANS (One copy to scale usually 1:100 or 1:50)**

- ☐ Layout of all floors fully dimensioned. For alterations and/or additions provide both new and existing floor plans
- ☐ Doors and window positions and sizes
- ☐ Layout of amenity areas (laundry etc)
- ☐ Main structural beams that are not shown elsewhere
- ☐ Lintel sizes
- ☐ HWC location
- ☐ Roof space access
- ☐ Gas cylinder location
- ☐ Room names
- ☐ Location of smoke alarms
- ☐ Location of heating unit (if applicable)

EXTERIOR ELEVATIONS (One copy to scale usually 1:100 or 1:50)

- ☐ Elevations of all external walls showing claddings
- ☐ Doors and windows showing opening sections
- ☐ Show location of solar panels
- ☐ Accurate ground levels existing and proposed
- ☐ Subfloor ventilation for timber floors
- ☐ Show roof bracing on elevations if not shown elsewhere

CROSS SECTION AND CONSTRUCTION DETAILS (One copy to scale usually 1:50 or 1:20 for sections and 1:10 for details - minimum scale)

- ☐ Roof lines, overhangs, floor levels, ground levels
- ☐ Major vertical dimensions
- ☐ Foundation, wall and roof structure materials
- ☐ Upper level decks or balconies over lower level room must be fully detailed including the stormwater disposal and overflow precautions
- ☐ Stairs, handrails and balustrade showing pitch and head clearances
- ☐ Structural connections, posts to footings, beams to posts, trusses or beams to walls
- ☐ Component fixing information is to be provided for all structural and framing components
- ☐ Foundation and footing details and reinforcing. Show height from finished floor to ground level
- ☐ Pile details for timber floors
- ☐ Floor bracing details
- ☐ Timber grade and treatment
- ☐ Damp proof membranes, building papers and insulation systems/materials
- ☐ Flashing details and documents
- ☐ Roof penetrations
- ☐ Shower floor details and wall to shower base junction detail
- ☐ Sealing to wet area fixtures
- ☐ Water splash prevention
- ☐ All other building components that are not otherwise detailed or are unusual in any way

SPECIFICATION (One copy)

The specification must be for the project. We will not accept standard specifications unless they relate directly to the building and they cover the project accurately and fully. Multichoice specifications will not be accepted. A brief accurate specification is usually best.

- ☐ Provide a written specification to cover all of the trades involved in the project. All materials used in the project are fully specified including fixings of all materials and components
- ☐ The specification can be written on the drawings as long as all materials are fully covered

IMPORTANT THINGS TO INCLUDE IN YOUR APPLICATION (One copy - where relevant)

- ☐ The chartered professional engineer's Producer Statement
- ☐ The engineer's monitoring schedule if the engineer chooses to do site monitoring
- ☐ All structural calculations
- ☐ Structural details showing connections and details of the components
- ☐ Solar technical details and plumbing schematic
- ☐ Log fire and flue installation instructions.
- ☐ If log fire secondhand, engineer's certification required
- ☐ Current potable water test (current within 18 months)
- ☐ Effluent disposal design & ECan's copy of the submitted application form or approval
- ☐ Wastewater system designs when required to be done by a chartered professional engineer such as in a hazard zone

**OFFICE
USE ONLY**
These have
been provided:

☐**GEOTECHNICAL REPORT**

- ☐ Unique report reference number provided, if applicable

☐**OFFICE USE ONLY**

Further information required? ☐ Yes ☐ No

Date of acceptance: Officer:

OFFICE USE ONLY

Fee paid on application: \$ Date: Officer:

Date payment processed: Receipt Officer:

All the relevant information on this form is required to be provided under the Building Act 2004 and/or Resource Management Act 1991 for the Waimakariri District Council to assess your application. Under these Acts this information has to be made available to members of the public if requested. The information contained in this application may be made available to other units of the Council. You have the right to access the personal information held about you by the Council which can be readily retrieved. You can also request that the Council correct any personal information it holds about you.

APPLICATION INFORMATION

- (a) Project Information Memorandum (PIM):
A PIM will be issued within 20 working days provided all the required information is supplied with the application.
Processing time is stopped whenever further information is required and starts again when the correct information is received. It is not mandatory to apply for a PIM. Applicants can choose not to apply for a PIM when they consider that the information would not be relevant for their building project.
A fee is required to accompany your PIM application (as per Council's fees and Charges Schedule).
- (b) Planning Check:
Where a PIM is not sought, a Planning Check will be undertaken to ensure your proposal complies with the District Plan.
- (c) Building Consent (BC):
A Building Consent will be processed within a maximum allowable time of 20 working days provided all the information required has been supplied. Processing time is stopped whenever further information is required and starts again when the correct information is received.
Once the Building Consent has been granted, you will receive notification, which will include an invoice for the fees payable. Once the fees are paid in full, your Building Consent will be issued. Work must not start until the Building Consent is issued, and any Resource Consent requirements have been resolved.
A Building Consent lapses and is of no effect if the building work to which it relates does not commence within 12 months after the date of issue of the Building Consent or any further period that the Building Consent Authority may allow.
- (d) Combined Project Information Memorandum & Building Consent Applications:
Applications for a combined PIM/BC will only be accepted when sufficient information is provided to permit the Building Consent to be processed.
If insufficient information is provided, then further information will be requested, or your application may be returned to you.
- (e) If the applicant does not own the land, they must provide written approval from the owner to submit this application.

LEVIES PAYABLE

Council are required to collect levies for the MBIE and BRANZ. No levy shall be payable if the value of that work is less than \$20,000. If your project is valued at \$20,000 or more, the fixed fee will increase by the value of the MBIE and BRANZ levies.

INSPECTIONS

During the process of construction, inspections will be necessary to confirm all work complies with your approved Building Consent documentation. Please phone the Council Building Unit on 03 311 8906 at least 48 hours in advance of requiring an inspection to ensure that this can be arranged.

The inspections required will be set out in the Building Consent documentation issued by the Council. Failure to have a prescribed inspection carried out may put the issue of the Code Compliance Certificate at risk.

Failed inspections will incur a re-inspection charge.

RESOURCE CONSENT

Your application will be assessed by the Planning Unit of the Council to determine whether your project complies with the relevant District Plan requirements.

If your application does not comply with District Plan requirements you will need to either amend your proposal to comply or apply for a Resource Consent. A Certificate will be attached to your Project Information Memorandum to notify that a Resource Consent is required prior to building work commencing. It is recommended that you phone the Planning Unit on 0800 965 468 to discuss the process.

CODE COMPLIANCE CERTIFICATE

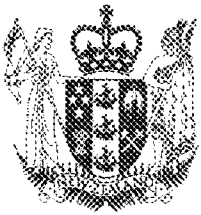
A Building Consent is not completed until it has been issued with a Code Compliance Certificate. The owner is required to complete a separate application for a Code Compliance Certificate as soon as practicable after the building work is completed. In any event no later than two (2) years after the granting of the Building Consent, Council is required to decide whether or not a Code Compliance Certificate can be issued. If your project will not be completed within two years you will need to apply for a time extension*.

*Fees apply

AGENCY

The owner may authorise an agent to submit an application on their behalf.

The Agent will be the first point of contact for all communications with the Council/Building Consent Authority regarding this application under Sections 33 and 45 and if authorised, the application for a Code Compliance Certificate under Section 92 of the Building Act 2004. They will receive all correspondence and must be authorised by the Owner - see page 8. All amendments require new authorisation.



**COMPUTER FREEHOLD REGISTER
UNDER LAND TRANSFER ACT 1952**



Search Copy


R.W. Muir
Registrar-General
of Land

Identifier 745462
Land Registration District Canterbury
Date Issued 29 September 2016

Prior References

CB15F/286

Estate Fee Simple
Area 625 square metres more or less
Legal Description Lot 20 Deposited Plan 500690

Proprietors

James David Foote and Ruqiah Hannah Dean

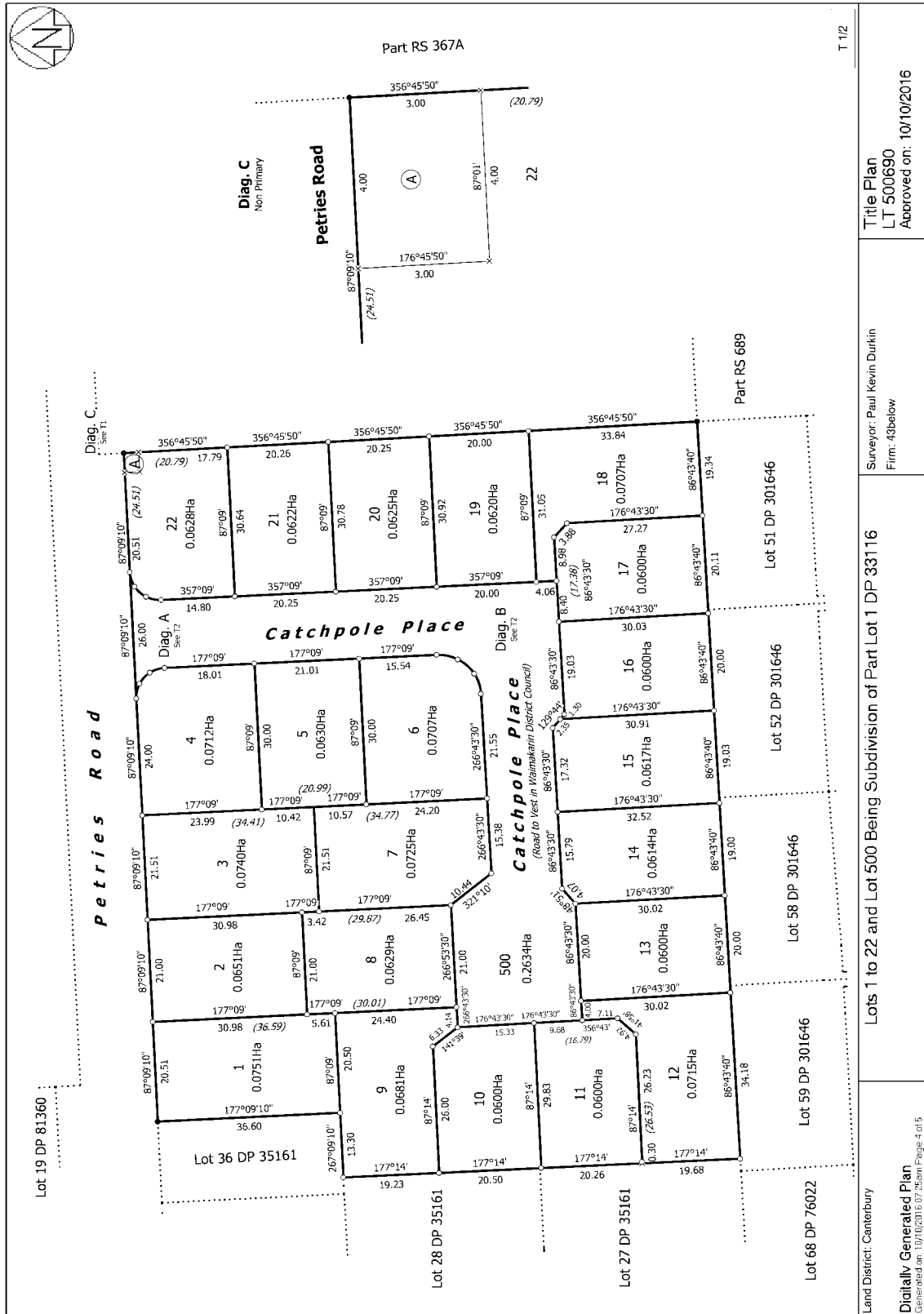
Interests

Land Covenant in Easement Instrument 10492281.3 - 29.9.2016 at 1:48 pm

Fencing Covenant in Transfer 10757840.1 - 10.4.2017 at 3:47 pm

10922149.2 Mortgage to ASB Bank Limited - 6.10.2017 at 3:01 pm

Identifier 745462



AGREEMENT AND AUTHORITY TO PROCEED WITH WORK

For Proposal No: 03209 (QQ002846)

A) Parties

The Builder is: AG and LM McCarthy Ltd (the 'Builder')
Christchurch North Franchisee for G.J.
Gardner Homes

The property is located at: Lot 20 Catchpole Place, WOODEND (the 'Property')

The Owner/s is/are: Kiah and James Foote (the 'Owner')

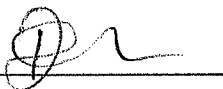
B) Covenants

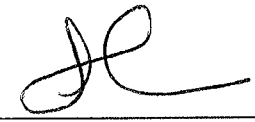
- 1 In preparation for the construction of a house on the Property, the Owner hereby authorises and directs the Builder to obtain such reports as are necessary, including a soil report, contour plan, geotechnical review, subdivision report (or any other reports necessarily required) from a consultant engineer (the 'Reports') and/or commission the preparation of plans, drawings, specifications and consents in relation to any earthworks, retaining walls, or footings and foundations. All costs incurred by the Builder (including any overheads and a margin of 15%) in obtaining the Reports and/or designs, drawings, specifications or consents shall be met by the Owner. The Owner consents to any such costs incurred by the Builder being deducted from any funds, including any deposit, paid by the Owner to the Builder for the construction of a house on the Property.
- 2 The Owner warrants that any work performed by the Owner at the Property, including any demolition work, earthworks and/or foundation work has been carried out in accordance with approved plans, drawings, designs and specifications and in accordance with the Building Act 2004 and the Building Code. The Owner hereby authorises the Builder and its employees, servants and agents to have full access to the Property to undertake any preparatory work and/or building work.
- 3 If the Builder incurs costs (including any overheads and margin) in undertaking any work described in paragraphs 1 to 2 above which exceed any deposit paid by the Owner to the Builder in respect of the construction of the house on the Property (or under any building contract), the Owner agrees to pay the Builder for any such costs incurred by the Builder within 14 days of receiving a written invoice for such costs from the Builder. The Owner agrees to indemnify the Builder for any costs or expenses incurred by the Builder, including legal costs on a solicitor-client basis, to recover any sums due to the Builder under this Agreement.
- 4 The Owner acknowledges and agrees that the selection of the Property is entirely at the risk of the Owner including, without limitation, as to the suitability of the Site for the Works. Without limiting the foregoing, the Builder shall not be liable for any information supplied by any third party concerning the Property, and the review of any such information and the assessment of the implications of the information for the Works shall be the sole responsibility of the Owner. The Owner warrants that all details have been disclosed to the Builder as to any covenants or other conditions relating to the Property which may affect the costs of construction.



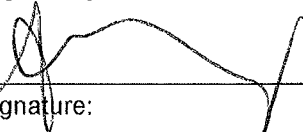
- 5 The Owner acknowledges and agrees that all plans, designs, drawings and specifications, whether in standard form or developed between the Owner and the Builder, remain copyright to the Builder. If the Owner provides to the Builder any plans, designs, drawings and specifications, then the Owner shall indemnify the Builder, its employees, directors, shareholders, subcontractors, employees, servants and agents from any claim which may be brought against the Builder in relation to copyright over those plans, designs, drawings and specifications or otherwise arising from the use of such documents.
- 6 The Owner acknowledges that prior to entering into this Agreement the Builder has provided to the Owner the prescribed checklist required under section 362D of the Building Act 2004.

C Execution**Signed by Owner/s:**


Signature: _____
Ruqiah
Kiach Foote
Full Name: _____
29/04/17
Date: _____


Signature: _____
James Foote
Full Name: _____
29/04/17
Date: _____

Signed by Builder:


Signature: _____
ANDREW MCCARTHY
Full Name: _____
1/5/17
Date: _____

G.J. Gardner. HOMES

Thursday, 27 April 2017

Kiah and James Foote
4A Hudson Street
Bryndwr
CHRISTCHURCH

Dear Kiah and James,

Sales Proposal No: 03209 (QQ002846)
Lot 20 Catchpole Place, WOODEND

Thank you for the opportunity to present this sales proposal. We appreciate selecting your builder is a very important decision and respect you have many choices.

This proposal is designed to assist you make an informed confident decision in selecting G.J. Gardner Homes and provide clarity that the proposed home design and products selected are to your satisfaction, by clearly setting out the important details of the home you have planned. It includes:

- ✓ Your concept plan;
- ✓ The specification (products selected for your home);
- ✓ Exactly what is included/provided; and
- ✓ Any Provisional Sums and importantly the amount allowed.

Accordingly it is important you read the content carefully and are comfortable you completely understand it. We want all our clients to enjoy the experience of building their new home and for it to be exactly the home you created with us, with only good surprises.

On your acceptance of this offer the exciting part begins, your journey to moving in. We will commence:

- ✓ Scheduling the building of your new home in our system and with our trades and suppliers;
- ✓ Completing any engineering requirements for your design or site;
- ✓ Developing your concept plans into full working drawings; and
- ✓ Preparing your building consent application in readiness for submitting it to council.

Confirmation of your acceptance is achieved by signing the included 'Authority to Proceed' along with paying the preliminary deposit. The authority to proceed is reasonably self explanatory but may include industry jargon not familiar to you, so if you require, I am of course more than happy to go over this with you.

We'd love you to enjoy building your new home so much so that we want it to be an easy decision for you to choose GJs if you were to build again, and also, that you would have no hesitation in recommending GJ's to your friends and family.

We know we have to work hard to achieve your complete satisfaction and potential recommendation. We give you our commitment to do so, including working professionally, openly, and honestly with you at all times. Accordingly we will not use deceptive pricing methods to win your business.

Please contact me on 027 259 2468 if you have any queries or if I can be of any help. If I do not hear from you beforehand, I trust it is acceptable that I contact you within the week to follow up and see how you have progressed.

Again many thanks for giving G.J. Gardner Homes the opportunity to provide this proposal.

Yours sincerely



Liz Williams
Sales Consultant

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HOUSE DESIGN AND SPECIFICATIONS PACKAGE

This proposal and the total price is based on our modified design and our specifications.
Please note that all council and/or water company development and upgrade levies are payable direct by the client unless otherwise stated in this document

The total cost (including GST) is: ~~\$324,447.00~~ KF JF

Upon acceptance of this Sales Proposal a preliminary deposit of \$ 3000 is required to be paid.

Should the contract not proceed, the amount of \$ 3000 and any other additional costs are non refundable.

To indicate your acceptance of this proposal we require the owner/s to sign the attached document, "Authority to Proceed", and return this to us along with a cheque for the preliminary deposit.

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PREScribed CHECKLIST

About this checklist

A building contractor is required to provide you with this checklist and other prescribed information under the Building Act 2004 before you sign a contract for the building work if -

- (a) you request this checklist and the prescribed disclosure information; or
- (b) the building work is going to cost \$30,000 or more (including GST).

The building contractor is the person or company you have asked to do building work for you.

The building contractor may not be an actual builder. The building contractor could be a plumber, an electrician, or any other tradesperson who is doing some building work for you and whom you are dealing with directly.

Steps (See notes below)	Completed (Tick when completed)
1 Become informed	
2 Agree on project structure and management	
3 Hire competent building contractors	
4 Agree on price and payments	
5 Have a written contract	
6 Take control	
7 Resolving disputes	

Notes

Step 1 – Become informed

All building work must comply with the provisions of the Building Act 2004. You can find a copy of the Building Act 2004 on the New Zealand Legislation website: www.legislation.govt.nz

Building work is any work done in relation to the construction or alteration of a building. This includes any work done on your home or other structure, such as a garage, retaining walls, and fences. It also includes work like painting, decorating, and landscaping if it is part of the construction or alteration of a building.

However, if the only work you are getting done is redecorating and there is no construction or alteration work involved, it is not building work. If landscaping work does not include any structures (eg, pergolas or retaining walls), it is also not building work.

All building work requires a building consent unless it is exempt under the Building Act 2004.

Generally, only simple or low-risk work is exempt from the requirement to have a building consent. Certain gas and electrical work is also exempt. For more information, go to www.mbie.govt.nz

Building work that is significant or of higher risk (such as structural alterations) requires a building consent and must be carried out or supervised by a licensed building practitioner. For more information on these requirements, go to www.mbie.govt.nz

Step 2 – Agree on project structure and management

Building projects do not run themselves. Decide how you want to manage the building project.


A few different roles are needed on a building project. You need someone to -

- manage timelines and costs;
- manage subcontractors;
- liaise with the local council;
- make decisions about the design of the work.

You can do some of this yourself, but if you are not knowledgeable about the building work process, you should get help from an architect, an independent project manager, a building company, or a licensed building practitioner who is licensed to co-ordinate the building work involved.

You should be really clear about the scope and size of the project and get detailed plans up front.

Be clear with your building contractor about who is doing the building work and who is responsible for making design and change decisions during the project.


 JF
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Step 3 - Hire competent building contractors

Ensure that your building contractor has the skills and resources to carry out the project.

You should -

- ask around about the building contractor and get references for other work that the building contractor has done;
- find out if the building contractor is a licensed building practitioner or has other appropriate qualifications. For more information about licensed building practitioners, go to www.mbie.govt.nz
- determine whether the building contractor has sufficient insurance to cover the work while it is being carried out;
- ask about the building contractor's employees and what subcontractors the building contractor will use on the project;
- if the building contractor is a company, look up its company records on the Companies Office's Internet site. If your search raises concerns, ask the building contractor to explain.

Step 4 - Agree on price and payments

The contract should clearly state what payments are required and when. Where possible, a fixed price is preferable.

The lowest price is not always the best price.

You should -

- get detailed quotes (not estimates) for the building work;
- when comparing quotes, ensure that the scope of the building work and the materials and fixtures that you are comparing are the same across quotes so that you are "comparing apples with apples";
- make sure you have the funds to pay for the project before the work begins and that you understand the payment terms agreed with the building contractor;
- think carefully before agreeing to pay more than the cost of the work that has been completed and the costs of any materials that have been supplied at the time you make the payment.

Step 5 - Have a written contract

You should have a written contract. The contract should include items such as -

- a description of the building work;
- the start and completion dates for the building work;
- how variations to the building work will be agreed;
- the payment process, including dates or stages for payment and how payments will be invoiced, made and receipted;
- the dispute resolution processes to be followed.

You should obtain legal advice to ensure that you understand your rights and obligations and that the contract complies with all legal requirements.

Note: The Building Act 2004 requires that there must be a written contract for residential building work with a value of \$30,000 or more (including GST), and the Building (Residential Consumer Rights and Remedies) Regulations 2014 prescribe matters that must be included in every contract for residential building work with a value of \$30,000 or more. You can find a copy of the Building Act 2004 and the Building (Residential Consumer Rights and Remedies) Regulations 2014 on the New Zealand Legislation website: www.legislation.govt.nz

Step 6 - Take control

All residential building work is covered by implied warranties prescribed by the Building Act 2004 that address matters such as workmanship and building work being fit for purpose. For more information, go to www.mbie.govt.nz

You should -

- make sure there is a clear line of communication with the building contractor through the site foreman, the project manager, or any other person who has authority to speak on behalf of the building contractor. (This person should be identified as the "key contact person" in the prescribed disclosure information that the building contractor has provided along with this checklist);
- when you are making decisions along the way, be clear as to whether those decisions will affect your contract and costs. If you do decide to make a change, keep track of the effect of that change.

Step 7 - Resolving disputes

It is in both your interests and the building contractor's interests to keep the building project running smoothly and to deal with any disputes as they arise.

If you have concerns about the building project, raise them with the building contractor (or the key contact person) as soon as possible.

Raise your concerns in good faith and use the dispute resolution processes agreed to in your contract. For information on your options, go to www.mbie.govt.nz

If you have received an invoice that you have concerns about, clearly outline your concerns to the building contractor in writing.

If you fail to make a payment when it is due, the building contractor might start dispute resolution proceedings before you have a chance to explain why you have not paid. (Simply withholding payment when there is a dispute will often make the situation worse.)

Further information

For more information, go to www.mbie.govt.nz or call the Ministry of Business, Innovation, and Employment on 0800 242 243.

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Date 13/7/17

~~Cross out non applicable council~~

~~Christchurch City Council
PO Box 73013
Christchurch 8154~~

Waimakariri District Council
Private Bag 1005
Rangiora 7440

~~Hurunui District Council
(use separate form)~~

To Whom It May Concern

Re: Construction of Dwelling

Address: 5 Catchpole Place insert build address
Woodend

Please direct all correspondence such as Requests for Information, Consents, etc. in relation to the construction of the dwelling listed above to our builder (details below):

G.J. Gardner Homes - Christchurch North
PO Box 21382
Edgware 8143
Email: penny.wade@gjgardner.co.nz

Thank you for your assistance with the above.

Yours faithfully

All property owners as per Legal Title (including Trusts and Trustee's)

<u>James Foote</u>	<u>Ruriah Foote</u>
name	name	name
<u>[Signature]</u>	<u>[Signature]</u>
signed	signed	signed

Form 2A

Memorandum from licensed building practitioner: Certificate of design work**Section 45 and Section 30C, Building Act 2004**

Please fill in the form as fully and correctly as possible.

If there is insufficient room on the form for requested details, please continue on another sheet and attach the additional sheet(s) to this form.

THE BUILDING

Street address: 5 Catchpole Place

Suburb: Woodend

Town/City: Waimakariri

Postcode:

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
171675 10/11/2017 nicolah

THE OWNER

Name(s): James & Kiah Foote

Mailing : 4A Hudson Street

Suburb: Bryndwr

PO Box/Private Bag:

Town/City: Christchurch

Postcode: 8053

Phone: 022 1377 007

Email address:

BASIS FOR PROVIDING THIS MEMORANDUM

I am providing this memorandum in my role as the: Please tick the option that applies (✓)	
()	sole designer of all of the RBW design outlined in this memorandum – I carried out all of the RBW design myself – no other person will be providing any additional memoranda for the project
()	lead designer who carried out some of the RBW design myself but also supervised other designers – this memorandum covers their RBW design work as well as mine, and no other person will be providing any additional memoranda for the project
(✓)	lead designer for all but specific elements of RBW – this memorandum only covers the RBW design work that I carried out or supervised and the other designers will provide their own memoranda relating to their specific RBW design
()	specialist designer who carried out specific elements of RBW design work as outlined in this memorandum – other designers will be providing a memorandum covering the remaining RBW design work

IDENTIFICATION OF DESIGN WORK THAT IS RESTRICTED BUILDING WORK (RBW)

I Min Kyoo Jun carried out ~~supervised~~ the following design work that is restricted building work

PRIMARY STRUCTURE: B1

Design work that is restricted building work	Description	Carried out/ supervised	Reference to plans and specifications
Tick(✓) if included Cross (X) if excluded	[If appropriate, provide details of the restricted building work]	[Specify whether you carried out this design work or supervised someone else carrying out this design work]	[If appropriate, specify references]

Primary structure				
All RBW Design work relating to B1	()		() Carried out () Supervised	
Foundations and subfloor framing	(√)	Refer to Cresco Design Memo for foundation design/ Gravel Raft	() Carried out (√) Supervised	Supporting Docs./ Foundation Plan(s) & Detail(s)
Walls	(√)	Timber framed construction to NZS 3604	(√) Carried out () Supervised	Floor Plans & Section
Roof Truss	(√)	Supply & checking of design criteria to truss manufacturer. Incorporation of Roof Trusses designed by Placemakers / Mitek into the building.	() Carried out (√) Supervised	Refer to Producer Statement from Mitek and Buildable Truss Layout from Placemakers in Supporting Docs.
Roof (Non Truss items)	(√)	Non Truss Items, ceiling & tile battens to NZS3604	(√) Carried out () Supervised	Roof Plan & Roof Details
Columns and beams	(X)		() Carried out () Supervised	
Bracing	(√)	Wall Bracing to NZS 3604 using GIB Ezybrace Cals	(√) Carried out () Supervised	Bracing Plan(s) & EzyBrace Cals
Other -Deck: Foundations, subfloor framing, handrails	(X)		() Carried out () Supervised	
EXTERNAL MOISTURE MANAGEMENT SYSTEMS: E2				
All RBW design work relating to E2	(√)	As below	(√) Carried out () Supervised	
Damp proofing	(√)	DPM under slab, DPC under framing & roofing underlay	(√) Carried out () Supervised	Details
Roof cladding or roof cladding system	(√)	PMT roofing on self supporting roof underlay	(√) Carried out () Supervised	Roof Plan & Roof Details
Ventilation system (for example, subfloor or cavity)	(√)	Mechanical ventilation ducted to soffit. Vented cavities to cladding	(√) Carried out () Supervised	Floor Plan & Details
Wall cladding or wall cladding system	(√)	Cladding on vented cavity over building wrap	(√) Carried out () Supervised	Floor Plan & Details
Waterproofing / Water splash areas	(√)	Bath plinth, showers & all splashbacks	(√) Carried out () Supervised	Wet Area Details
Other			() Carried out () Supervised	

Fire safety systems (C1–C6)			
Emergency warning systems, evacuation and fire service operation systems, suppression or control systems, or other	(X) Smoke alarms (with test & hush buttons)	() Carried out () Supervised	Floor Plan

Note: The design of fire safety systems is only restricted building work when it involves small-to-medium apartment buildings as defined by the Building (Definition of Restricted Building Work) Order 2011.

Note: continue on another page if necessary.

WAIVERS AND MODIFICATIONS

Waivers or modifications of the building code are required () Yes (√) No

If Yes, provide details of the waivers or modifications below:

Clause	Waiver/modification required
[List relevant clause numbers of building code]	[Specify nature of waiver or modification of building code]

ISSUED BY

Name: Min Kyoo Jun	LBP or Registration number: BP 123346
The practitioner is a: (√) Design LBP () Registered architect	() Chartered professional engineer
Design Entity or Company (optional): G J Gardner Homes, Christchurch North	
Mailing address (if different from below):	
Street address / Registered office: 293 Cranford Street, St Albans, Christchurch	
Suburb: Edgware	Town/City: Christchurch
PO Box/Private Bag: PO Box 21-382	Postcode: 8143
Phone number: 03 323 9154	Mobile:
After Hours:	Fax:
Email address: joe.jun@gjgardner.co.nz	Website:

DECLARATION

I Min Kyoo Jun [name of practitioner], LBP,

state that I have applied the skill and care reasonably required of a competent design professional in carrying out or supervising the Restricted Building Work (RBW) described in this form, and that based on this, I also state that the RBW:

- Complies with the building code; or
- ~~Complies with the building code subject to any waiver or modification of the building code recorded on this form.~~

Signature: 

Date: 20/09/2017

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
171675 10/11/2017 nicolah

Form 2A

Memorandum from licensed building practitioner: Certificate of design work
Section 45 and Section 30C, Building Act 2004
THE BUILDINGStreet address: **5 Catchpole Place**Town/City: **Woodend****THE OWNER / DEVELOPER**Name(s): **Amber Page****BASIS FOR PROVIDING THIS MEMORANDUM**I am providing this memorandum in my role as the: Tick ☒ if included ☐ if excluded

<input type="checkbox"/>	sole designer of all of the RBW design outlined in this memorandum – I carried out all of the RBW design myself – no other person will be providing any additional memoranda for the project
<input type="checkbox"/>	lead designer who carried out some of the RBW design myself but also supervised other designers – this memorandum covers their RBW design work as well as mine, and no other person will be providing any additional memoranda for the project
<input type="checkbox"/>	lead designer for all but specific elements of RBW – this memorandum only covers the RBW design work that I carried out or supervised and the other designers will provide their own memoranda relating to their specific RBW design
<input checked="" type="checkbox"/>	specialist designer who carried out specific elements of RBW design work as outlined in this memorandum – other designers will be providing a memorandum covering the remaining RBW design work

IDENTIFICATION OF DESIGN WORK THAT IS RESTRICTED BUILDING WORK (RBW)I, **Fabio Parodi**, ~~carried out~~ / supervised the following design work that is restricted building work**PRIMARY STRUCTURE: B1**

Design work that is restricted building work	Description	Carried out/ supervised	Reference to plans and specifications
Primary structure			
All RBW Design <input type="checkbox"/> work relating to B1		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	
Foundations and subfloor framing <input checked="" type="checkbox"/>	<i>Residential Foundation Design Services</i>	<input type="checkbox"/> Carried out <input checked="" type="checkbox"/> Supervised	<i>See PS1</i>
Walls <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	
Roof <input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	

Columns and beams	<input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	
Bracing	<input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	
Other	<input type="checkbox"/>		<input type="checkbox"/> Carried out <input type="checkbox"/> Supervised	

ISSUED BYName: **Fabio Parodi**LBP or Registration number: **1025559**
 The practitioner is a: ☐ Design LBP ☐ Registered architect ☒ Chartered professional engineer
Design Entity or Company: **CRESO ENGINEERS NEW ZEALAND LIMITED**Mailing address (if different from below): **PO Box 9200 8149 Addington Christchurch**Street address / Registered office: **c.o. M J Mowat, 290 Clyde Road**Suburb: **Bryndwr**Town/City: **Christchurch**

PO Box/Private Bag:

Postcode: **8053**

Phone number:

Mobile: **027 838 8338**

After Hours:

Fax:

Email address: **f.parodi@cresco-group.com**Website: **www.cresco.co.nz****DECLARATION**I **Fabio Parodi** [name of practitioner], LBP,

state that I have applied the skill and care reasonably required of a competent design professional in carrying out or supervising the Restricted Building Work (RBW) described in this form, and that based on this, I also state that the RBW:

- Complies with the building code; or
- ~~Complies with the building code subject to any waiver or modification of the building code recorded on this form.~~

Signature:



Date: 16/09/17

WAIMAKARIRI DISTRICT COUNCIL
 Plans and specifications APPROVED in accordance
 with the Building Act 2004, clause 49 and the Building
 Regulations 1992, Clause 3
 171675 10/11/2017 nicolah

SECTION 2

Geotech, Engineer Reports & Conditions PS1 & 2

- Calculations**
- A4 Details**

26 October 2016

GW Woodend Limited
145 Papanui Road
P O Box 36-511
Christchurch 8146

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
171675 10/11/2017 nicholah

Issued via email to

Attn: Kerry Watson
Email: Kerry@gwlimited.nz

Two Roads Subdivision Stage 1 - Technical Classification Geotechnical Report

1 Introduction

GW Woodend Limited has recently subdivided a 1.7ha area of rural land into 22 residential lots with associated roading and drainage. This development is Stage 1 of the wider Two Roads residential development and located off Petries Road in Woodend.

A geotechnical subdivision assessment was carried out in 2012 prior to the release of the Ministry of Business, Innovation and Employment (MBIE) Guidelines which provides guidance for geotechnical investigation and classification of subdivisions in the Canterbury Region.

In order to provide an updated Technical Category Classification for the Two Roads Stage 1 development, GW Woodend Limited has engaged Aurecon to carry out additional geotechnical testing and confirm the Technical Category Classification of the site on a lot by lot basis using the latest MBIE Guidelines and methodologies.

Our work was carried out as an extension our existing 30 June 2015 agreement with GW Woodend Limited for the Two Road Woodend Subdivision. Our limitations are presented at the end of this report. This report shall be read as a whole.

This Revision 2 report incorporates minor amendments and clarifications, and supersedes all previous revisions.

2 Geotechnical Testing

Three sets of geotechnical testing have been carried out across the site as follows:

- Kirk Roberts (2012) - Seven CPT tests (CPT001 to 007) were carried out by Kirk Roberts in 2012 for the previous site owner as part of the original subdivision assessment. These tests were undertaken to refusal at depths between 4.5m and 14.8mbgl.
- Elliott Sinclair (2016) - Six CPT tests (CPT01 to 06) carried out by Elliott Sinclair in July 2016 at Lots 5, 9 and 20 to confirm the Technical Category Classification of these three lots only. These tests were all carried out to a depth of 10m.
- Aurecon (2016) – 10 CPT tests (CPT101 to 110) were carried out by Aurecon in two phases. McMillan's Drilling Group carried out five CPT tests (CPT101 to 105) on Lots 16-19 and 21 on the 29 September 2016. Phase 2 by Land Test to carried out an additional five CPT tests (CPT106 to 110) on Lots 2, 6, 7, 13 and 15 on 13 October 2016. The tests were extended to effective refusal or a maximum of 10m depth.

We have used all of the CPT data above in our liquefaction and Technical Category Classification assessments and the CPT test locations are shown on the Figure 1 attached.

3 Ground Conditions

Based on the geotechnical testing to date, the site is underlain by variable interbedded layers of silts and sands with some lenses of organic-silt material and an intermediate sandy-gravel / gravelly-sand layer. This gravelly layer becomes sandier and less dense towards the eastern side of the site.

Groundwater was recorded by Elliott Sinclair at 1.7mbgl during their July 2016 assessment. This matches the groundwater level we encountered during the bulk excavation of the ground remediation works on the adjacent Two Roads Stage 2 area and the stand pipe piezometer installed in the southwest corner of Stage 2 on the northern side of Petries Road. Groundwater is expected to vary seasonally or following periods of drought or heavy precipitation.

4 Liquefaction Hazard Assessment

We have undertaken a liquefaction hazard assessment using the method prescribed in the MBIE Guidelines using both the 2016 Aurecon and the 2012 Kirk Roberts CPT data and reviewed the results of the 2016 Elliott Sinclair assessment which uses the same MBIE methodology as our assessment. Additionally, ground damage has been assessed under the various MBIE design level earthquake events using the Liquefaction Severity Number (LSN) methodology detailed in T&T (2013) and using the method of Ishihara (1985).

Accounting for seasonal variation and the measurement of groundwater during a dry winter period, for design purposes we have assumed a groundwater table at 1.5m depth.

The results of our assessment are summarised in Table 1 appended to this letter. Based upon our assessment there is no distinct geological feature causing higher liquefaction induced settlements (i.e. an old infilled river channel etc.), but the variability in the thickness and density of the sand and silty-sandy soils.

Based upon this assessment and review of Elliott Sinclair's assessments for Lots 5, 9 and 20 we make the following comments:

Lots 1 to 7, 9 to 15, 17, 18, 21 and 22

The calculated liquefaction induced ground deformations are within the limits of a Technical Category 2 (TC2) classification, i.e. minor to moderate ground damage could be expected in a future major seismic event.

Lots 8, 16, 19 and 20

Lots 8, 16, 19 and 20 in their natural form were identified as being noncompliant with the requirements of a TC2 classification based on an indexed liquefaction induced reconsolidation settlement criteria. The wider site is underlain by interbedded silty-sandy soils. However the sand content increases in these lots resulting an increase theoretical reconsolidation settlement in the areas with the higher sand content in the surficial soils.

5 Liquefaction Risk Mitigation

The following liquefaction hazard mitigation is recommended for the site:

Lots 1 to 7, 9 to 15, 17, 18, 21 and 22

No additional liquefaction risk mitigation is required for these lots other than an enhanced TC2 type of foundation system.

Lots 8, 16, 19 and 20

In order to ensure a TC2 classification across the entire site and provide additional seismic resilience we recommend that the 1.2m thick geogrid reinforced gravel ground improvement layer is constructed below and extending at least 1m beyond the building footprint of new houses. The ground improvement works have been based upon *Type G1d Shallow Densified Crust Treatment* option presented in Section 15 of the MBIE (2012) Guidelines. With this ground improvement implemented a TC2 foundation system can be used at these sites. An indicative cross section of this capping layer is appended to this report.

6 Foundation Recommendations

The following foundation recommendations are made for residential houses to be built at the site:

Lots 1 to 7, 9 to 15, 17, 18, 21 and 22 – Natural Ground

With Lots 1 to 7, 9 to 15, 17, 18, 21 and 22 TC2 foundation are required as outlined in Section 5 of the MBIE (2012) Guidelines. In accordance with the Guidelines standard shallow lot specific shallow geotechnical investigations are required during the detailed house design to assess the lot specific ground conditions and bearing capacity values. These shallow investigations should be undertaken by the designer of the house foundation to confirm appropriate foundation types and shallow bearing capacities.

Lots 8, 16, 19 and 20 – Capping Layer

With Lots 8, 16, 19 and 20 it is recommended the houses are:

- Founded directly onto the underlying gravel capping layer utilising the 200kPa bearing capacity TC2 type enhanced slab foundations (Options 2 to 4 in Section 5.3.1 of the MBIE Guidelines), or a suspended timber floor (based upon the recommendations in Section 5.3.2 of the MBIE Guidelines / NZS3604:2011) with the design pro rata to use 200kPa bearing capacity.
- To provide the best seismic resilience houses should:
 - Be formed from conventional one to two storey residential construction
 - Single storey only if heavy cladding and roofing is used
 - Up to two storeys if light to medium weight cladding and roofing is used.
 - The structural form should be restricted to timber frame (or light weight cold-rolled steel equivalent).

These foundations systems can be founded directly onto the underlying gravel. With the enhanced raft foundation options all topsoil and silty-sandy soil should be removed below the entire house footprint and if required replaced with compacted hardfill (95% of maximum dry density).

Due to the presence of the geogrid reinforcement within the gravel, and the capping function that the geogrid reinforced gravel raft preforms, penetrations through the geogrid must be avoided. Houses build in these lots should not have basements protruding through the

capping layer. Underfloor hydraulic services and conduits (wastewater, stormwater etc.), where possible should be designed in such a way that they do not penetrate through the geogrid reinforcement either and stay within the upper 900mm of the reinforced gravel layer.

7 References

Aurecon, 2015. *Gladstone Road Subdivision Geotechnical Subdivision Report, Revision 1* - dated 28 August 2015. Aurecon New Zealand Limited, Christchurch, New Zealand.

Boulanger R.W. and Idriss, I.M. (2014). *CPT and SPT Based Liquefaction Triggering Procedures*, Center for Geotechnical Modelling. Report No. UCD/CGM-14/01

Ishihara. (1985). *Stability of natural deposits during earthquakes*. Proceedings, 11th International Conference on Soil Mechanics and Foundation engineering, Vol 1, pp. 321-376.

MBIE, 2012. *Repairing and rebuilding houses affected by the Canterbury earthquakes*. Ministry of Business, Innovation and Employment, Wellington, New Zealand.

Tonkin and Taylor. (2013). *Liquefaction Vulnerability Study*, Tonkin and Taylor Report 52020.0200/v1.0. February 2013. 52 pages and 14 appendices.

8 Limitations

We have prepared this report in accordance with the brief as provided. The contents of the report are for the sole use of the Client and no responsibility or liability will be accepted to any third party. Data or opinions contained within the report may not be used in other contexts or for any other purposes without our prior review and agreement.

The recommendations in this report are based on data collected at specific locations and by using suitable investigation techniques. Only a finite amount of information has been collected to meet the specific financial and technical requirements of the Client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it must be appreciated that actual conditions could vary from the assumed model.

Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

Subsurface conditions, such as groundwater levels, can change over time. This should be borne in mind, particularly if the report is used after a protracted delay.

This report is not to be reproduced either wholly or in part without our prior written permission.

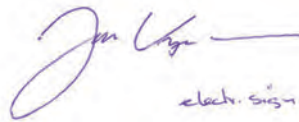
This conclusions in this report draws on investigations, analysis and conclusions from various investigations stages and numerous reports. For specific details please refer to the above mentioned references or contact the writers.

If you have any queries regarding the content of this letter, please do not hesitate to contact the undersigned.

Yours sincerely



Tim Mitchell
Geotechnical Engineer



Dr Jan Kupec
Technical Director – Ground Engineering

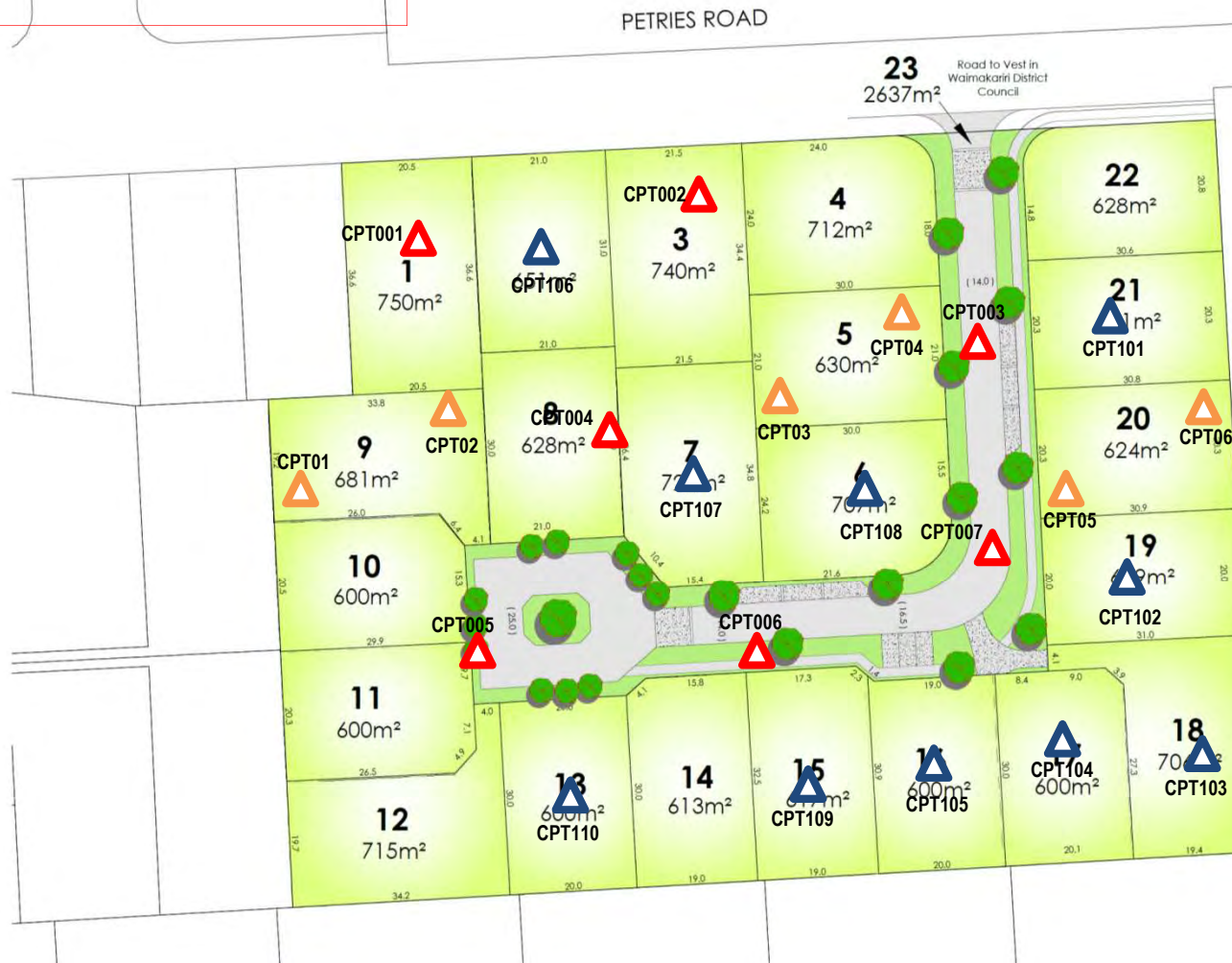
Enc:

Figure 1 – CPT Test Location Plan

Figure 2 – Geogrid Capping Layer Detail

Table 1 – Liquefaction Assessment Results

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
171675 10/11/2017 nicolah



Legend

- CPT Kirk Roberts 2012 CPT
- CPT Eliot Sinclair 2016 CPTu
- CPT Aurecon 2016 CPTu

CLIENT

PRELIMINARY NOT FOR CONSTRUCTION

ALL DIMENSIONS APPROXIMATE ONLY

SCALE

SIZE

TITLE

CPT TEST LOCATION PLAN

NTS

A4

BY

T. MITCHELL

APPROVED

D. MAHONEY

DATE

26 OCTOBER 2016

REFERENCE

BACKGROUND IMAGE FROM DAVIE LOVELL SMITH
DRAWING NO. C17796

FIGURE No.

PROJECT

248126

WBS

001

TYPE

FIG

DISC

TRA

NUMBER

01

REV

B

FIGURE

FIGURE 1

PROJECT

TWO ROAD SUBDIVISION

REINFORCED GRAVEL RAFT BACKFILL NOTES

1. COMPACTED REINFORCED GRAVEL RAFT BACKFILL MATERIAL SHALL BE CAP40, CAP65 OR CRUSHED RECYCLED CONCRETE TO AP65 GRADING WITH AT LEAST TWO BROKEN FACES (NOT PIT RUN/RIVER RUN) COMPACTED TO 95% MAXIMUM DRY DENSITY AT $\pm 2\%$ OF OPTIMUM WATER CONTENT. FILL GRADING SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
2. THE CONTRACTOR SHALL PROVIDE THE ENGINEER AT LEAST 48 HOURS NOTICE PRIOR TO COMMENCEMENT OF FILLING A 20kg REPRESENTATIVE SAMPLE OF THE CAP40 OR CAP 65 MATERIAL TO BE USED. THE CONTRACTOR SHALL ALSO PROVIDE PARTICLE SIZE DISTRIBUTION TEST, COMPACTION TEST AND BROKEN FACE PERCENTAGE TEST RESULTS FROM A REPRESENTATIVE SAMPLE TESTED IN AN INDEPENDENT LABORATORY. THE TEST RESULTS SHALL BE PROVIDED PRIOR TO THE PLACEMENT OF ANY FILL ON SITE. THE TEST SAMPLE SHALL BE TAKEN FROM SITE OR QUARRY STOCKPILE WITHIN 30 DAYS OF SITE WORKS.
3. A MINIMUM LOOSE THICKNESS OF 150mm OF FILL SHALL BE PLACED OVER GEOGRIDS PRIOR TO OPERATING TRACKED CONSTRUCTION EQUIPMENT OVER THEM. CARE SHOULD BE TAKEN NOT TO OVERWORK THE SUBGRADE OR TO CAUSE WEAVING WHEN COMPACTING INITIAL LAYER OF GRAVEL.
4. PLACEMENT AND COMPACTION OF THE FILL SHALL BE COMPLETED IN STAGES BY PLACING LAYERS OF COMPACTED GRAVEL, FOLLOWED CLOSELY BY THE PLACEMENT OF GEOGRIDS. THE FILL SHALL BE COMPACTED TO 95% OF MODIFIED COMPACTION IN ACCORDANCE WITH NZS 4402:1986, TEST 4.1.3. TESTING IS REQUIRED ON EACH LIFT OF AGGREGATE.
5. HARDFILL SHALL BE PLACED IN LAYERS NOT EXCEEDING 200mm MAXIMUM THICKNESS.
6. THE GRAVEL SHALL HAVE A GRADING THAT FALLS WITHIN CCC CIVIL ENGINEERING STANDARD SPECIFICATION GRADING CURVES FOR "CCC AP65" OR "CCC STABILISED AP40" WHEN TESTED IN ACCORDANCE WITH NZS 4407:1991 TEST 3.8.1 (WET SIEVING).
7. THE CRUSHED RECYCLED CONCRETE SHALL HAVE A GRADING THAT FALLS WITHIN THE CCC CIVIL ENGINEERING STANDARD SPECIFICATION GRADING CURVES WHEN TESTED IN ACCORDANCE WITH NZS 4407:1991 TEST 3.8.1 (WET SIEVING).

EXCAVATION AND FOUNDATION REQUIREMENTS

1. EXCAVATION IS REQUIRED FOR CONSTRUCTION OF THE GRAVEL RAFT. THE DETAILS PROVIDED ON THE DRAWINGS SHOW NET FINISHED CONSTRUCTION PROFILES. THE CONTRACTOR SHALL ESTABLISH THE METHODS OF EXCAVATION NEEDED, THE PLANT REQUIREMENT AND GENERAL SEQUENCING OF CONSTRUCTION TO MAINTAIN A STABLE AND SAFE CONDITION INCLUDING SAFE SLOPES.
2. ALL TEMPORARY EXCAVATIONS AND CONSTRUCTION ACTIVITY SHALL COMPLY WITH THE OCCUPATIONAL SAFETY AND HEALTH GUIDELINES.
3. ANY SOFT GROUND, LOW STRENGTH OR ORGANIC MATERIAL ENCOUNTERED AT SUBGRADE LEVEL SHALL BE REMOVED AND REPLACED WITH COMPACTED GRANULAR FILL. REFER TO THE GEOTECHNICAL REPORT FOR ANTICIPATED GROUND CONDITIONS.
4. THE CONTRACTOR SHALL TAKE APPROPRIATE MEASURES TO KEEP EXCAVATIONS DRY AND STABLE UNTIL CONSTRUCTION OF GRANULAR BACKFILL IS COMPLETE.
5. WHERE MATERIAL IS USED AS ENGINEERED BACKFILL BENEATH GRAVEL RAFT, THE BACKFILL SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY BASED ON MODIFIED COMPACTION (NZS4402:1986, TEST 4.1.3)

GEOGRID REINFORCEMENT

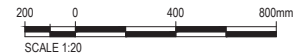
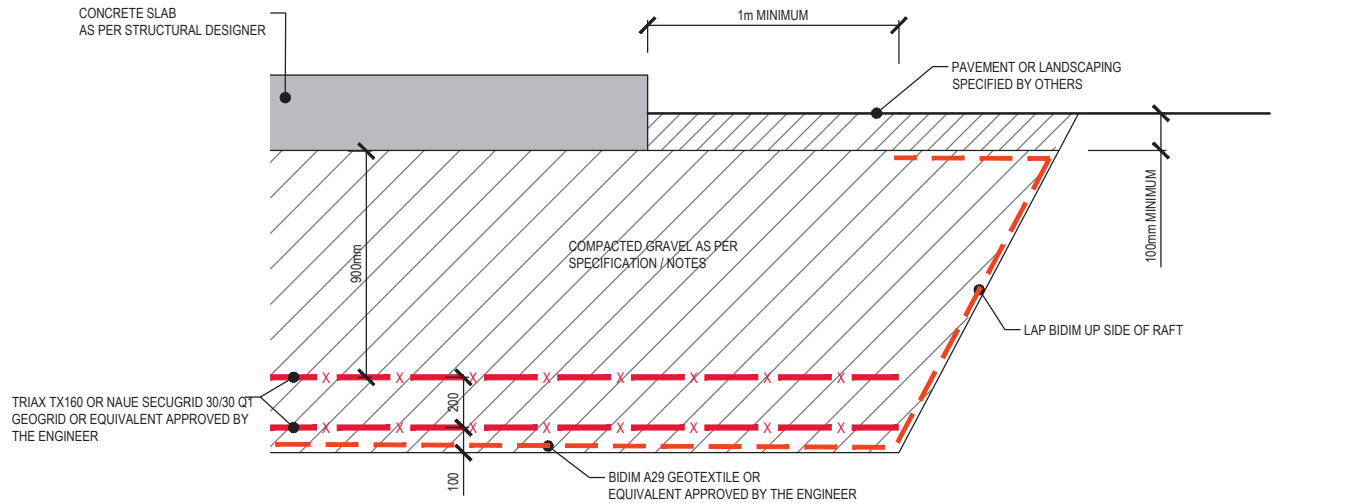
1. REINFORCING GEOGRID TO BE TRIAX TX160 OR NAUE SECUGRID 30/30 Q1 GEOGRID OR EQUIVALENT APPROVED BY THE ENGINEER.
2. LAYERS OF GEOGRID SHALL BE LAID IN ALTERNATING PERPENDICULAR ORIENTATION (i.e. EACH LAYER OF GEOGRID SHALL BE LAID PERPENDICULAR TO THE LAYER BELOW).
3. GEOGRIDS SHALL BE LAID TO THE MANUFACTURER'S SPECIFICATION WITH MIN. LAP OF 500mm UNLESS CONFIRMED OTHERWISE BY MANUFACTURER.
4. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY QA/QC DOCUMENTATION FOR ALL GEOGRIDS INCORPORATED INTO PERMANENT WORKS.
5. ALL GEOTEXTILE AND GEOGRIDS SHALL BE HANDLED AND STORED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATION AND GOOD PRACTICE. ALL GEOTEXTILES SHALL BE PROTECTED FROM DEGRADATION BY UV LIGHT.
6. ALL GEOTEXTILES AND GEOGRIDS SHALL BE LAID ON A FLAT SURFACE AND APPROPRIATELY TENSIONED PRIOR TO PLACEMENT OF FILL. THE GEOTEXTILE AND GEOGRID SHALL REMAIN TENSIONED DURING GRAVEL PLACEMENT AND COMPACTION.

SERVICES

1. ALL SERVICES SHALL BE AT LEAST 100mm ABOVE GEOGRIDS.

DEWATERING

1. IF GROUNDWATER IS ENCOUNTERED IN THE EXCAVATION THE GEOTECHNICAL ENGINEER SHALL BE CONTACTED TO UNDERTAKE AN INSPECTION BEFORE ANY DEWATERING IS UNDERTAKEN.
2. ANY DEWATERING POINTS SHALL BE LOCATED OUTSIDE THE BUILDING FOOTPRINT. DEWATERING METHOD, EITHER WELL POINTS OR SUMP PUMP, TO BE CONFIRMED BY CONTRACTOR AND AGREED WITH GEOTECHNICAL ENGINEER.



REV	DATE	REVISION DETAILS	APPROVED
A	20/10/2016	ISSUE TO CLIENT	J KUPEC
B	26/10/2016	ISSUE TO CLIENT - MINOR AMENDMENTS	J KUPEC

SCALE	SIZE
AS SHOWN	A3
DRAWN	
T MITCHELL	
DESIGNED	
D MAHONEY	
CHECKED	
J KUPEC	

NOT FOR CONSTRUCTION
APPROVED
J KUPEC
DATE
26/10/2016
J KUPEC

PROJECT	TWO ROADS STAGE 1
TITLE	TC3 GRAVEL CAPPING LAYER
DRAWING No.	248126
PROJ No.	0000
DRG	DRG
CG	CG
NUMBER	0001
REV	B

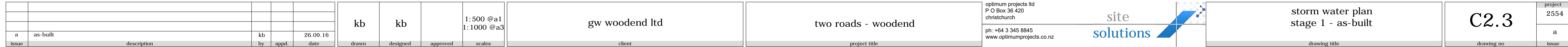
Table 1 – Liquefaction Hazards Assessment Results

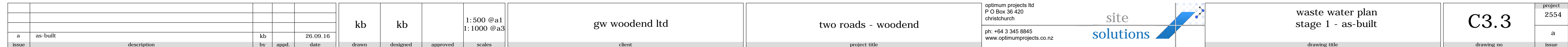
	Test	Test Depth	SLS-a			SLS-b			ULS			Technical Category
			Settlement	Surface Expression		Settlement	Surface Expression		Settlement	Surface Expression		
			Indexed	Ishihara	LSN	Indexed	Ishihara	LSN	Indexed	Ishihara	LSN	
Kirk Roberts 2012	CPT001	10.5m	1mm	No	1	4mm	No	1	17mm	No	9	TC1
	CPT002	14m	7mm	No	3	18mm	No	2	46mm	No	16	TC2
	CPT003	10m	36mm	No	12	60mm	No	10	104mm	Yes	33	TC3
	CPT004	14.8m	53mm	No	18	81mm	Yes	17	94mm	Yes	25	TC3
	CPT005	5m	2mm	No	2	8mm	No	1	28mm	No	13	TC2*
	CPT006	5m	1mm	No	1	5mm	No	1	8mm	No	3	TC2*
	CPT007	7m	10mm	No	7	6mm	No	6	39mm	No	13	TC2*
Aurecon 2016	CPT101	10m	6mm	No	5	21mm	No	4	57mm	Yes	23	TC2
	CPT102	10m	45mm	No	22	89mm	Yes	19	112mm	Yes	36	TC3
	CPT103	10m	20mm	No	10	42mm	No	8	78mm	Yes	26	TC2
	CPT104	10m	25mm	No	13	51mm	No	11	94mm	Yes	33	TC2
	CPT105	10m	50mm	No	13	70mm	No	12	107mm	Poss	31	TC3
Aurecon 2016	CPT106	10m	17mm	No	5	28mm	No	4	54mm	Poss	16	TC2
	CPT107	10m	14mm	No	7	34mm	No	5	68mm	Yes	22	TC2
	CPT108	10m	24mm	No	6	47mm	No	5	100mm	Yes	29	TC2
	CPT109	10m	15mm	No	10	37mm	No	9	71mm	Yes	25	TC2
	CPT110	10m	20mm	No	7	33mm	No	6	56mm	Yes	18	TC2
Eliott Sinclair 2016	CPT01	10m	6mm		2	45mm		6	47mm		14	TC2
	CPT02	10m	38mm		9	66mm		20	90mm		28	TC2/3**
	CPT03	10m	5mm		2	22mm		11	45mm		19	TC2
	CPT04	10m	40mm		9	64mm		18	85mm		26	TC2/3**
	CPT05	10m	33mm		7	64mm		17	82mm		21	TC2/3
	CPT06	10m	55mm		11	87mm		23	107mm		29	TC3

Notes:

* Due to the CPT refusing on very dense sandy-gravelly material and the limited settlements in the upper 5-7m these tests have been assessed as TC2

** Classified TC2 equivalent by Eliott Sinclair due to depth of liquefiable layers.







PRODUCER STATEMENT – PS1 – DESIGN

ISSUED BY (Design Firm): **CRESCO ENGINEERS NEW ZEALAND LIMITED**
 TO (Owner/Developer): **Amber Page**
 TO BE SUPPLIED TO (Building Consent Authority): **Waimakariri District Council**
 IN RESPECT OF (Description of Building Work): **Residential Foundation**
 AT (Street Address): **5 Catchpole Place**
 (Town/city): **Woodend**
 LOT: **20** DP: **500690** SO:

We have been engaged by the owner/developer referred to above to provide **Residential Foundation design services** in respect of the requirements of Clause(s) **B1** of the Building Code for All ☒ or Part only ☐ (as specified in the attachment to this statement), of the proposed building work.

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

- ☒ Compliance Documents issued by the Ministry of Business, Innovation & Employment **VM1, VM4**
☐ Alternative solution as per the attached schedule:

The proposed building work covered by this producer statement is described on the documents titled **5084 - F001_A** and **5084 - C001_A**; together with the specification, and other documents set out in the schedule attached to this statement (if any).

On behalf of the Design Firm, and subject to:

- (i) All proprietary products meeting their performance specification requirements;
 (ii) Site verification of the following design assumptions: **Geotechnical Report ref. 248126 dated 26/10/16, by Aurecon New Zealand Limited**.

I **believe on reasonable grounds** that a) the structure, 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 and that b), the persons who have undertaken the design have the necessary competency to do so. I also recommend the following level of construction monitoring/observation:

☐ CM1 ☒ CM2 ☐ CM3 ☐ CM4 ☐ CM5 (Engineering Categories) or ☐ as per agreement with owner/developer (Architectural)

I, **Fabio Parodi** hold ☒ CPEng registration No. **1025559**

I am a Member of : ☒ IPENZ and hold the following qualifications: **CPEng, Dott. Ing (ITA), M.Eng (Hons)**

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000*.

SIGNED BY **FABIO PARODI** ON BEHALF OF **CRESCO ENGINEERS NEW ZEALAND LIMITED**

WAIMAKARIRI DISTRICT COUNCIL
 Plans and specifications APPROVED in accordance
 with the Building Act 2004, clause 49 and the Building
 Regulations 1992, Clause 3
 171675 10/11/2017 nicolah



(signature)

Date: 16/09/17

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

Important Advisory Note

Cresco Engineers New Zealand Limited (Cresco) is supplying Producer Statements to be submitted to territorial or building consent authorities in order for Code of Compliance Certificates to be issued.

Producer statements are not a product warranty or guarantee of compliance.

Producer statements deal with compliance at the date on which they were written. They will not necessarily provide assurance of on-going compliance.

The design provided by Cresco and covered under this Producer Statement (Design) cannot be used by any third party and cannot be used if there are changes in the laws or regulations.

Only the Owner/Developer, and the Building Consent Authority are entitled to rely upon this Design. Cresco accepts no liability to anyone other than the Owner/Developer in any way in relation to the Design and the content of it and any direct or indirect effect this Design may have. Cresco does not contemplate anyone else relying on this Design or that it will be used for any other purpose.

The Design is based upon information provided by the Owner/Developer or his representatives and no warranty is included; either expressed or implied that the actual site conditions and forces generated by structures designed by others will conform to the information that Cresco has received.

When the Design includes foundation design, the check for the pressure generated by the foundation onto the ground is provided. When the pressure is above and beyond the values indicated in the geotechnical report / site tests provided by the Owner/Developer, the Design includes the calculation of the depth of the compacted granular fill required to comply.

The Granular Fill Required Depth (D) is intended to be read as:
"the required depth of the compacted granular fill beneath the foundation for a specified value of the ground Ultimate Bearing Capacity (immediately underneath the granular fill and subject to site verification) in absence of any unfavorable condition such as: (a) potentially compressible ground such as top soil, soft soils such as very soft clays which can be moulded easily in the fingers, and un-compacted loose gravel which contains obvious voids (b) expansive soils being those that have a liquid limit of more than 50 % when tested in accordance with NZS 4402 Test 2.2, and a linear shrinkage of more than 15 % when tested from the liquid limit in accordance with NZS 4402 Test 2.6; and (c) any ground which could foreseeably experience movement of 25 mm or greater for any reason including one or a combination of land instability, ground creep, subsidence, seasonal swelling and shrinking, frost heave, changing groundwater level, erosion, dissolution of soil in water, and effects of tree roots".

The investigation of the above mentioned unfavorable conditions as well as the remediation works to be undertaken (for example, but not limited: cut of the top soil, any groundworks that may extend beyond the depth of the granular fill indicated by us, deep ground improvements of any kind...) are outside of the scope of the Design.

The Design is not intended to alter or substitute the instructions contained in a geotechnical report when available and it is under the responsibility of the Client to undertake the necessary actions to assess the suitability of the ground in the respect of the unfavorable conditions listed above.

The PS1 (Producer Statement - Design) is intended for use by a suitably qualified, competent design professional (i.e. Chartered Professional Engineer) as a statement of opinion. The opinion is based on reasonable grounds that certain aspects of proposed building work will comply with the Building Code, if the work is constructed according to the referenced documentation (e.g. engineering design drawings and specifications).

The PS1 records the means of compliance e.g. the Acceptable Solution or Verification Method used and it only covers specifically designed building elements or specifically designed portions / strengthening of building elements. The Chartered Professional Engineer signatory of the Producer Statements does not provide professional opinion for means of compliance of construction elements designed/completed in accordance with design/construction procedures contained within technical manuals of proprietary systems.

The PS4 (Producer Statement - Construction Review) is intended for use by a suitably qualified, competent design professional as a statement of opinion. This is based on reasonable and stated grounds which may include the records of construction monitoring and information supplied by (i) the contractor (ii) by a person acting under the control of the Chartered Professional Engineer or (iii) collected by the Chartered Professional Engineer himself, that certain aspects of building work have been completed according to the building consent and amendments.

It is under the responsibility of the Owner / Developer's agent or contractor to notify Cresco when site observations are to be required.

Cresco strongly recommends to provide sufficient notice (at least 5 working days) prior to time of site observation.

The records of construction monitoring and instructions (including authorization to proceed with concrete pouring when applicable) are provided, upon Chartered Professional Engineer's review and approval, generally within 24 hours from the date of the site observation.

A Chartered Professional Engineer nominated by Cresco will issue a PS4 if the building works have been completed (i) in accordance with the relevant requirements of the Building Consent and Building Consent Amendments, (ii) in compliance with the structural documentation and if (iii) at least all construction monitoring visits recommended within the inspection schedule as stated on the consent documents have been carried out by inspectors appointed by Cresco.

Cresco is unable to providing site observation for unauthorized and non-consent works.

Should anyone wish to discuss the content of this Design with Cresco Engineers New Zealand Limited, they are welcome to contact us on **0800 11 33 11** or support@cresco.co.nz.

Thank you for choosing Cresco
We are the inventors of the
technology behind the Xpod™.

CALCULATION NOTE



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5 CATCHPOLE PLACE - WOODEND

PROJECT

5084 C001 A

DOCUMENT

REV.

15.09.17

DATE

MPA

ISSUED BY

EXECUTIVE SUMMARY

Cresco Engineers New Zealand Limited has been engaged to provide engineering design service in respect of the Clause B1 of the New Zealand Building Code for the foundation of a residential dwelling at the address reported in the footing of this document.

Ground performance assessment, ground improvement design, superstructure design (included anchor plates and bolts) are outside the scope of this document.

The site has been classified Technical Category (TC2) as defined within the Guidelines "Repairing and rebuilding houses affected by the Canterbury earthquakes" issued by MBIE – Liquefaction damage is possible in future large earthquakes. Standard enhanced foundation rebuild options in accordance with MBIE Guidance are suitable to mitigate against this possibility.

For this building a waffle slab consistent with Option 4 MBIE Clause 5.3 has been designed.

For this project a 300 mm deep reinforced concrete waffle slab-on-ground with edge beams 300 mm wide and internal biaxial ribs wide at 750 mm x 750 mm centers has been specifically designed.

Specific design considerations allowed a reduction of the overall depth of the foundation notwithstanding the compliance of the structure with New Zealand regulations and performance set out at clause 5.4 of the MBIE Guidelines.

Information about the building (number of floors, roof and cladding types) is contained within the paragraphs titled "Geometry" and "Loads".

Information about the ground shallow bearing capacity is contained within the paragraph titled "Ground".

Information about construction materials is contained within the paragraph titled "Materials".

DISCLAIMER

Only the Owner/Developer indicated within the PS1 (the Client) and the Local and Regional Territorial Authorities are entitled to rely upon this calculation note.

Cresco Engineers New Zealand Limited accepts no liability to anyone other than the Client in any way in relation to this document and the content of it and any direct or indirect effect this calculation note may have. Cresco does not contemplate anyone else relying on this calculation note or that it will be used for any other purpose.

Cresco Engineers New Zealand Limited does not accept any responsibility for any indirect effect this calculation note may have in consequence of inaccurate information provided by the Client of his appointees.

On behalf of Cresco Engineers New Zealand Limited

Fabio Parodi

CPEng, Dott. Ing (ITA), M.Eng (Hons)

**DESIGN NOTES**

1) Geotechnical report mentioned within the PS1

2) Load cases: following MBIE design guide, 5 load cases representing the worst situation have been taken into account:

Load case 1: 2 m loss of edge bearing support, cantilevering of slab rib

Load case 2: 2 m loss of edge bearing, cantilevering of edge beam at corner

Load case 3: 4 m loss of bearing, internal beam

Load case 4: 4 m loss of support of internal rib across Load Bearing internal beam

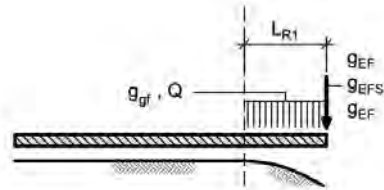
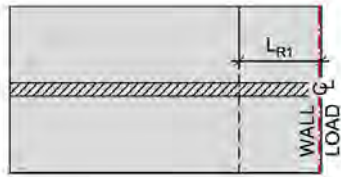
Load case 5: 4 m loss of bearing, edge beam

These load cases are described in the following pages.

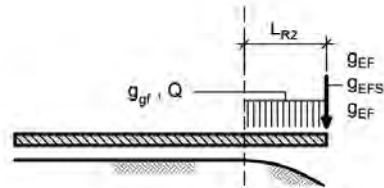
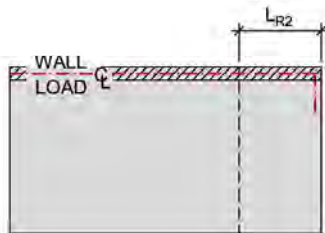
WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
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171675 10/11/2017 nicolah

LOAD CASES

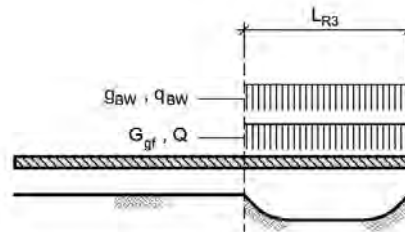
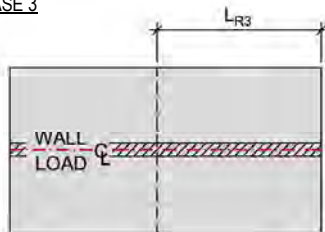
LOAD CASE 1



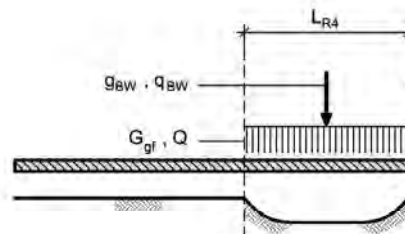
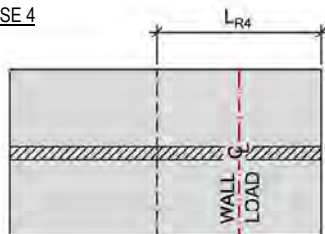
LOAD CASE 2



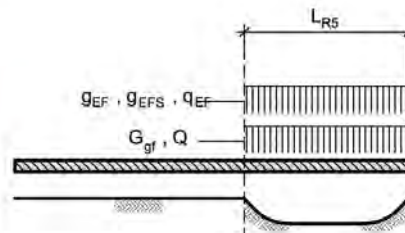
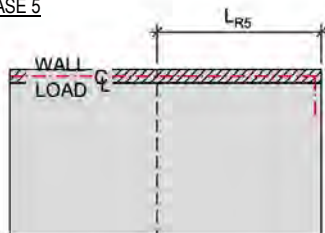
LOAD CASE 3



LOAD CASE 4



LOAD CASE 5



LOADS**Roof**

Lightweight $G_r = 0,41 \text{ kN/m}^2$

Second Floor

Floor $g_{2nd} = 0,00 \text{ kN/m}^2$

Partitions $g_p = 0,00 \text{ kN/m}^2$

Other loads $g_{o2nd} = 0,00 \text{ kN/m}^2$

Total Second floor permanent load $G_{2nd} = 0 \text{ kN/m}^2$

Ground Floor

Ribraft 215/750 $g_s = 3,66 \text{ kN/m}^2$

Partitions $g_p = 0,25 \text{ kN/m}^2$

Other loads $g_{os} = 0,00 \text{ kN/m}^2$

Total Ground floor permanent load $G_{gf} = 3,91 \text{ kN/m}^2$

Walls

1st floor exterior walls type: Heavyweight $G_{ew} = 1,6 \text{ kN/m}^2$

2nd floor exterior walls type: None $G_{ew2} = 0,0 \text{ kN/m}^2$

Bearing walls

Bearing walls selfweight $G_{bw} = 0,30 \text{ kN/m}^2$

Imposed load

Residential Loads $Q = 1,50 \text{ kN/m}^2$

Roof Loads $Q_r = 0,25 \text{ kN/m}^2$

Garage Loads $Q_g = 2,50 \text{ kN/m}^2$

Garage Point Load $Q_{wheel} = 13,00 \text{ kN}$

Other Point Loads (short term) $Q_{o,short} = 0,00 \text{ kN}$

Other Point Loads (long term) $Q_{o,long} = 0,00 \text{ kN}$

GEOMETRY

Number of floors $N_{floors} = 1$

Roof tributary length (max) $S_r = 4,10 \text{ m}$

2nd floor tributary length (max) $S_{2nd} = 0,00 \text{ m}$

Bearing wall supporting the 2nd floor tributary length (max) $S_{bw2} = 0,00 \text{ m}$

Bearing wall supporting the roof tributary length (max) $S_{bwT} = 4,00 \text{ m}$

2nd floor exterior walls height (max) $H_{ew2} = 0,00 \text{ m}$

Ground floor exterior walls height (max) $H_{ew} = 2,50 \text{ m}$

Edge Beam width $b_e = 0,300 \text{ m}$

Foundation total depth $h_f = 0,300 \text{ m}$

Edge walls width $W_{bw} = 0,200 \text{ m}$

Intermediate beam width $b_i = 0,100 \text{ m}$

Effective contact width $b_c = 0,263 \text{ m}$

Bearing walls foundation type: Ribraft 215/750

MATERIALS

Concrete Strength	$f_c =$	20 MPa
Concrete Selfweight	$\gamma_c =$	24 kN/m ³

GROUND

Ultimate Bearing Capacity (minimum required)	$U_{bc} =$	200 kPa
Dependable Bearing Capacity	$= U_{bc} / 2$	$D_{bc} =$ 100 kPa
Allowable Bearing Capacity	$= U_{bc} / 3$	$A_{bc} =$ 67 kPa

SOIL PRESSURE CHECKS**Edge Beam Pressures***Selfweight*

Roof	$= G_r \cdot S_r$	$g_r =$	1,68 kN/m
Second Floor	$= G_{2nd} \cdot S_{2nd}$	$g_{2nd} =$	0,00 kN/m
Walls	$= G_{ew} \cdot H_{ew} + G_{ew2} \cdot H_{ew2}$	$g_{ew} =$	4,00 kN/m
Edge Beam	$= \gamma_c \cdot b_e \cdot h_r$	$g_w =$	2,16 kN/m
Slab surface load	$= (g_{os} + g_p) \cdot (l_r / 2 + b_e)$	$g_{sf} =$	0,17 kN/m
Slab	$= \gamma_c \cdot t_s \cdot l_r / 2$	$g_s =$	0,77 kN/m
Total Selfweight loads	$= g_r + g_{2nd} + g_{ew} + g_{sf} + g_s + g_w$	$G_{EF} =$	8,77 kN/m

Imposed loads

Slab imposed load	$= Q \cdot (l_r / 2 + b_e)$	$q_s =$	1,01 kN/m
Second floor imposed load	$= Q \cdot S_{2nd}$	$q_{EF} =$	0,00 kN/m
Total imposed load	$= q_s + q_{EF}$	$Q_{EF} =$	1,01 kN/m

Redistribution Factor (FEA)

$$\xi = 0,66$$

Short term combination (1.2G + 1.5Q)

Edge Beam Pressure on ground	$= \xi \cdot (1.2 \cdot G_{EF} + 1.5 \cdot Q_{EF}) / b_e$	$P_{st} =$	27 kPa
Edge Beam dependable bearing capacity		$P_{max,dep} =$	37 kPa OK

Long term combination (G + 0.4Q)

Edge Beam Pressure on ground	$= \xi \cdot (G_{EF} + 0.4 \cdot Q_{EF}) / b_e$	$P_{lt} =$	20 kPa
Edge Beam allowable bearing capacity		$P_{max,all} =$	25 kPa OK

Ground Floor Pressures (Diffused)*Selfweight*

Total Ground floor permanent load	$G_{gf} =$	3,91 kN/m ²
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Imposed loads

Residential Loads	$Q =$	1,50 kN/m ²
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Short term combination (1.2G + 1.5Q)

Ground Floor Pressure	$= 1.2 \cdot G_{gf} + 1.5 \cdot Q$	$P =$	6,9 kPa
Ground Floor dependable bearing capacity		$P_{max} =$	17,8 kPa OK

Long term combination (G + 0.4Q)

Ground Floor Pressure	$= G_{gf} + 0.4 \cdot Q$	$P =$	4,5 kPa
Ground Floor allowable bearing capacity		$P_{max} =$	11,9 kPa OK

Ribs under Bearing Walls Pressure*Permanent Loads*

Roof	$= G_r \cdot S_{bw1}$	$g_r =$	1,64 kN/m
Second Floor	$= G_{2nd} \cdot S_{bw2}$	$g_{2nd} =$	0,00 kN/m
Bearing wall selfweight		$g_{bw} =$	0,75 kN/m
Internal beam	$= \gamma_c \cdot (b_l - b_{br}) \cdot (h_r - t_s)$	$g_w =$	0,00 kN/m
Total selfweight loads above slab	$= g_r + g_{2nd} + g_{bw} + g_w$	$g_{BW} =$	2,39 kN/m

Internal beam	$= \gamma_c \cdot b_l \cdot h_r$	$g_w =$	0,72 kN/m
Slab	$= \gamma_c \cdot t_s \cdot l_r$	$g_s =$	1,53 kN/m
Slab surface load	$= (g_{os} + g_p) \cdot (l_r + b_l - b_{br})$	$g_{sf} =$	0,19 kN/m
Total slab selfweight Loads	$= g_w + g_s + g_{sf}$	$G_{BW} =$	2,44 kN/m

Imposed loads

Second floor imposed load	$= Q \cdot S_{bw2}$	$q_{BW} =$	0 kN/m
Slab Imposed loads	$= Q \cdot (l_r + b_l - b_{br})$	$Q_{BW} =$	1,13 kN/m

Redistribution Factor (FEA)

$$\xi = 0,15$$

Short term combination (1.2G + 1.5Q)

Bearing wall linear load	$= 1.2 \cdot g_{BW} + 1.5 \cdot q_{BW}$	$q_{short,bw} =$	2,9 kN/m
Foundation load	$= 1.2 \cdot G_{BW} + 1.5 \cdot Q_{BW}$	$q_{short,f} =$	4,6 kN/m
Floor pressure on ground under bearing walls	$= (q_{short,bw} \cdot \xi + q_{short,f}) / b_c$	$q_{short,beam} =$	19 kPa
Foundation dependable bearing capacity		$q_{max} =$	33 kPa OK

Long term combination (G + 0.4Q)

Bearing wall linear load	$= g_{BW} + 0.4 \cdot q_{BW}$	$q_{long,bw} =$	2,4 kN/m
Foundation load	$= 1 \cdot G_{BW} + 0.4 \cdot Q_{BW}$	$q_{long,f} =$	2,9 kN/m
Floor pressure on ground under bearing walls	$= (q_{long,bw} \cdot \xi + q_{long,f}) / b_c$	$q_{long,beam} =$	12 kPa
Foundation allowable bearing capacity		$q_{max} =$	22 kPa OK

Ground Floor Pressures (Concentrated - Garage)*Short term combination (1.5Q)*

Garage Point Load		$Q_{wheel,short} =$	13,00 kN
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Redistribution Factor (FEA)

$$\xi = 0,1$$

Floor pressure on ground under Garage Point Load		$P =$	18 kPa
Floor dependable bearing capacity		$P_{max} =$	29 kPa OK

SLIDING RESISTANCE CHECK*Geometry*

Slab area		$A_s =$	179 m ²
Slab perimeter		$p_s =$	63 m
Waffle slab area	$= A_s - p_s \cdot b_e$	$A_w =$	160,5 m ²
Roof area		$A_r =$	219 m ²
2nd Floor area		$A_{2nd} =$	0 m ²
2nd floor perimeter		$p_{2nd} =$	0 m

Seismic data

Hazard factor		$Z =$	0,33
Elastic Site spectra for slab (T=0, Soil D/E)	$= Z \cdot 1.12$	$C_{dS} =$	0,3696
Elastic Site spectra for house (T=0.2, Soil D/E)	$= Z \cdot 3$	$C_{dH} =$	0,990

Slab mass

Perimeter beam weight	$= p_s \cdot b_e \cdot h_r \cdot \gamma_c$	$w_b =$	136,1 kN
Waffle slab weight	$= A_w \cdot G_{gf}$	$w_s =$	627,3 kN
Live Load	$= 0.4 \cdot A_s \cdot Q$	$w_{ll} =$	107,6 kN
Total slab weight	$= w_b + w_s + w_{ll}$	$M_s =$	871,1 kN

House Mass

Roof weight	$= A_r \cdot G_r$	$w_r =$	89,8 kN
Exterior wall weight	$= G_{ew} \cdot H_{ew} \cdot p_s + G_{ew2} \cdot H_{ew2} \cdot p_{2nd}$	$w_{ew} =$	252,0 kN
2nd floor weight	$= A_{2nd} \cdot G_{2nd}$	$w_{2nd} =$	0,0 kN
Interior wall weight (ext. 0.15 kPa)	$= 0.15 \cdot (A_w + A_{2nd})$	$w_{iw} =$	24,1 kN
Total house weight	$= w_r + w_{ew} + w_{iw} + w_{2nd}$	$M_H =$	365,9 kN

Building response

Slab horizontal force	$= M_s \cdot C_{dS}$	$H_s =$	321,9 kN
House horizontal force	$= M_H \cdot C_{dH}$	$H_H =$	362,2 kN
SRSS combined response	$= \sqrt{(H_s)^2 + (H_H)^2}$	$H =$	484,6 kN

Sliding check

Friction coefficient		$f =$	0,53 *
Sliding resistance	$= f \cdot (M_s + M_H)$	$H_R =$	655,6 kN

*NZSEE 2001 Conference: Paper No. 6.03.01 "Lateral Resistance of Shallow Foundations"

$H =$ 484,6 kN **OK**

FOR GROUND IMPROVEMENT WORKS REFER TO
248126 REPORT ISSUED BY AURECON ON THE 26.10.16

CALCULATION OF FORCES ON BEAMS AND RIBS

GEOMETRY

Top Slab Thickness	$t_s =$	0,085 m
Rib Bottom Width	$b_{br} =$	0,100 m
Rib Top Width	$b_{tr} =$	0,149 m
Total height of rib (rib+slab)	$h_r =$	0,300 m
Distance between ribs	$i_r =$	0,750 m
Inertia modulus of ribs	$I_r =$	2,25E+08 mm ⁴
Inertia modulus of edge beams	$I_e =$	6,75E+08 mm ⁴
Inertia modulus of intermediate beams	$I_i =$	2,25E+08 mm ⁴
Edge beam width	$b_e =$	0,300 m
Intermediate beam width	$b_i =$	0,100 m

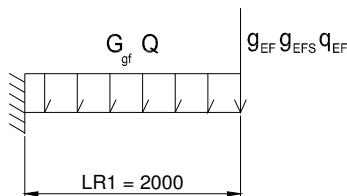
LOADS

<i>Edge Beam Loads</i>		
Roof	$= S_r G_r$	$g_r = 1,68 \text{ kN/m}$
Second floor	$= G_{2nd} S_{2nd}$	$g_{2nd} = 0,00 \text{ kN/m}$
Walls	$= H_{ew} G_{ew} + H_{ew2} G_{ew2}$	$g_w = 4,00 \text{ kN/m}$
Edge Beam Permanent Load	$= g_w + g_{2nd} + g_r$	$g_{EF} = 5,68 \text{ kN/m}$
Edge Beam selfweight	$= b_e h_r \gamma_c$	$g_{EFS} = 2,16 \text{ kN/m}$
Edge Beam Imposed Load	$= Q_{2nd} \cdot S_{2nd}$	$q_{2nd} = 0,00 \text{ kN/m}$
<i>Bearing Walls Loads</i>		
Bearing Walls Permanent Load		$g_{BW} = 2,39 \text{ kN/m}$
Bearing Walls Imposed Load		$q_{BW} = 0,00 \text{ kN/m}$

RESISTANCE CHECK

According to document "Repairing and rebuilding houses affected by the Canterbury earthquakes", Section 5.4 "guidance for specific design", foundations shall withstand a maximum unsupported length of 4 m beneath sections or 2 m at the extremes of the floor. Deflection shall be limited to 5 mm at sls.

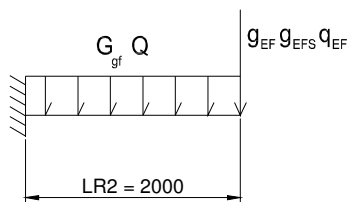
1) 2 m loss of edge bearing support, cantilevering of slab rib - results summary



Length of the rib	$L_{R1} =$	2,0 m
Half Bearing Wall Width	$L_1 =$	0,1 m
<i>Minimum Bending Moment</i>		
$= i_r [g_{EF} [L_{R1} - L_1] + g_{EFS} [L_{R1} - b_e / 2] + 1 / 2 G_{gr} [L_{R1} - b_e]^2 + 0.4 [q_{2nd} (L_{R1} - L_1) + 1 / 2 Q_{gr} (L_{R1} - 2L_1)^2]]$	$M_{1,rl} =$	16,1 kNm
	$\Phi M_{1,rl} =$	21,4 kNm OK
<i>Maximum Shear</i>		
$= i_r [g_{EF} + G_{gr} [L_{R1} - b_e] + 0.4 [q_{2nd} + Q_{gr} (L_{R1} - 2L_1)]]$	$V_{1,rl} =$	10,1 kN
	$\Phi V_{rl} =$	16,7 kN OK
<i>Deflection</i>		
$= \frac{i_r \cdot 1000 [g_{EF} + 0.3 q_{2nd}] [(L_{R1} - L_1) \cdot 1000]^3}{3 E_c I_r} + \frac{i_r [G_{gr} + 0.3 Q_{gr}] [(L_{R1} - L_1) \cdot 1000]^4}{8 E_c I_r}$	$d_{max1} =$	3,1 mm
Maximum allowable deflection	$d_{rl} =$	5,0 mm OK

CALCULATION OF FORCES ON BEAMS AND RIBS

2) External Footing with Transversal and Longitudinal Wall - 2m Loss of Support - results summary



Length of beam

 $L_{R2} = 2,0$ m

Bending Moment

$$= (b_e + i_r / 2)(g_{EF} + g_{EF} + 0.4q_{2nd})L_{R2} + (g_{EF} + 0.4q_{2nd} + g_{EFS})L_{R2}^2 / 2 + (i_r / 2)(G_{gf} + 0.4Q_{gf})L_{R2}^2 / 2$$

 $M_{2,ri} = 29,6$ kNm $\Phi M_{ri} = 40,3$ kNm **OK**

Maximum Shear

$$= (b_e + i_r / 2)(g_{EFS} + g_{EF} + 0.4q_{2nd}) + (g_{EF} + 0.4q_{2nd} + g_{EFS})L_{R2} + (i_r / 2)(G_{gf} + 0.4Q_{gf})L_{R2}$$

 $V_{2,ri} = 24,4$ kN $\Phi V_{ri} = 25,7$ kN **OK**

Deflection

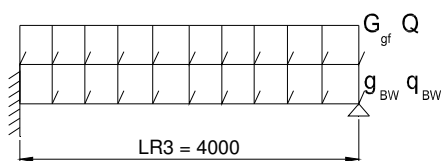
$$= \frac{1000[b_e + i_r / 2](g_{EFS} + g_{EF} + 0.3q_{2nd})[L_{R2} \cdot 1000]^3}{3E_c I_e} + \frac{[(i_r / 2)(G_{gf} + 0.3Q_{gf})\{L_{R2} \cdot 1000\}^4] + [(g_{EF} + 0.3q_{2nd} + g_{EFS})\{L_{R2} \cdot 1000\}^4]}{8E_c I_e}$$

 $d_{max2} = 2,3$ mm

Maximum allowable deflection

 $d_{ri} = 5,0$ mm **OK**

3) Rib - beam under bearing wall (parallel) - 4m Loss of Support - results summary



Length of the rib

 $L_{R3} = 4,0$ m

Redistribution factor (Massonet)

 $\xi_M =$

0,25

For Bending Moment

 $\xi_V =$

0,38

For Shear

Bending Moment

$$= (\xi_M[g_{BW} + 0.4q_{BW}] + i_r[G_{gf} + 0.4Q_{gf}])L_{R3}^2 / 8$$

 $M_{3,ri} = 8,0$ kNm $\Phi M_{ri} = 11,5$ kNm **OK** $\Phi M_{ri+} = 11,7$ kNm **OK**

Maximum Shear

$$= (\xi_V[g_{BW} + 0.4q_{BW}] + i_r[G_{gf} + 0.4Q_{gf}])L_{R3} / 2$$

 $V_{3,ri} = 8,6$ kN $\Phi V_{ri} = 12,8$ kN **OK**

Deflection

$$= \frac{2[\xi_M(g_{BW} + 0.3q_{BW}) + i_r(G_{gf} + 0.3Q_{gf})][L_{R3} \cdot 1000]^4}{384E_c I_i}$$

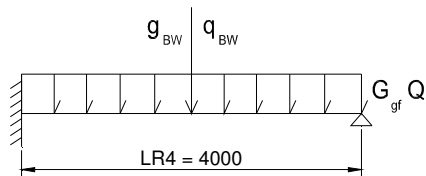
 $d_{max3} = 1,1$ mm

Maximum allowable deflection

 $d_{ri} = 5,0$ mm **OK**

CALCULATION OF FORCES ON BEAMS AND RIBS

4) Rib perpendicular to bearing wall - 4m Loss of Support - results summary



Length of the rib

 $L_{R4} = 4,0 \text{ m}$

Minimum Bending Moment

$$= i_r([g_{BW} + 0.4q_{BW}]L_{R4} / 8 + [G_{gf} + 0.4Q_{gf}]L_{R4}^2 / 8)$$

$$M_{4,rl} = 7,7 \text{ kNm}$$

$$\Phi M_{4,rl} = 11,5 \text{ kNm} \quad \text{OK}$$

Maximum Bending Moment

$$= i_r([g_{BW} + 0.4q_{BW}]L_{R4} / 8 + [G_{gf} + 0.4Q_{gf}]L_{R4}^2 / 12)$$

$$M_{4,rl+} = 4,6 \text{ kNm}$$

$$\Phi M_{4,rl+} = 11,7 \text{ kNm} \quad \text{OK}$$

Maximum Shear

$$= i_r([g_{BW} + 0.4q_{BW}] \cdot 11 / 16 + [G_{gf} + 0.4Q_{gf}] \cdot 5 / 8L_{R4})$$

$$V_{4,rl} = 5,6 \text{ kN}$$

$$\Phi V_{rl} = 12,8 \text{ kN} \quad \text{OK}$$

Deflection

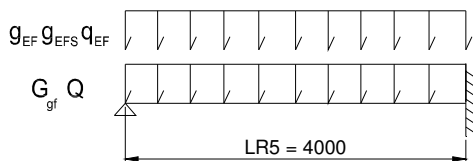
$$= i_r \left[\frac{(g_{BW} + 0.3q_{BW}) \cdot 1000(L_{R4} \cdot 1000)^3}{107E_c I_r} + \frac{2(G_{gf} + 0.3Q_{gf})(L_{R4} \cdot 1000)^4}{384E_c I_r} \right]$$

$$d_{max4} = 1,1 \text{ mm}$$

Maximum allowable deflection

$$d_{rl} = 5,0 \text{ mm} \quad \text{OK}$$

5) External Beam with Longitudinal Wall - 4m Loss of Support - results summary



Length of the beam

 $L_{R5} = 4,0 \text{ m}$

Minimum Bending Moment

$$= (g_{EF} + g_{EFS} + 0.4q_{2nd} + [i_r / 2][G_{gf} + 0.4Q_{gf}])L_{R5}^2 / 8$$

$$M_{5,rl} = 19,1 \text{ kNm}$$

$$\Phi M_{5,rl} = 30,6 \text{ kNm} \quad \text{OK}$$

Maximum Bending Moment

$$= (g_{EF} + g_{EFS} + 0.4q_{2nd} + [i_r / 2][G_{gf} + 0.4Q_{gf}])L_{R5}^2 / 12$$

$$M_{5,rl+} = 12,7 \text{ kNm}$$

$$\Phi M_{5,rl+} = 22,3 \text{ kNm} \quad \text{OK}$$

Maximum Shear

$$= (g_{EF} + g_{EFS} + 0.4q_{2nd} + [i_r / 2][G_{gf} + 0.4Q_{gf}])L_{R5} / 2$$

$$V_{5,rl} = 19,1 \text{ kN}$$

$$\Phi V_{rl} = 22,1 \text{ kN} \quad \text{OK}$$

Deflection

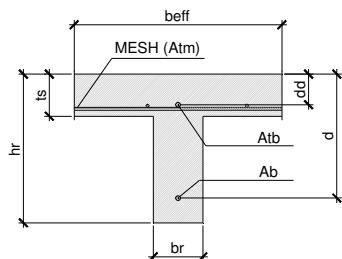
$$= \frac{2[g_{EF} + g_{EFS} + 0.3q_{2nd} + \{i_r / 2\}(G_{gf} + 0.3Q_{gf})][L_{R5} \cdot 1000]^4}{384E_c I_r}$$

$$d_{max5} = 2,6 \text{ mm}$$

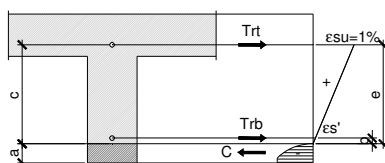
Maximum allowable deflection

$$d_{rl} = 5,0 \text{ mm} \quad \text{OK}$$

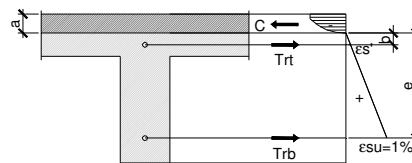
Load case 1: 2 m loss of edge bearing support, cantilevering of slab rib
 Check of rib: 100x300 - reinforced with 1 HD12 at top and 1 HD12 at bottom



HOGGING (FLANGE IN TENSION)



SAGGING (FLANGE IN COMPRESSION)

**GEOMETRY AND REINFORCEMENT**

Slab thickness		$t_s =$	85 mm
Web width		$b_r =$	100 mm
Ribs average width for shear		$b_w =$	130 mm
Total height of section (web+slab)		$h_r =$	300 mm
Effective top width		$b_{eff} =$	700 mm
Effective depth of top reinf. (from top)		$d_d =$	35 mm
Effective depth of bot. reinf. (from top)		$d =$	232 mm
Top bar	1 HD 12	$A_{tb} =$	113 mm ²
Top mesh		$A_{tm} =$	146 mm ² /m
Total top reinforcement		$A_t =$	215 mm ²
Bottom bar	1 HD 12	$A_b =$	113 mm ²

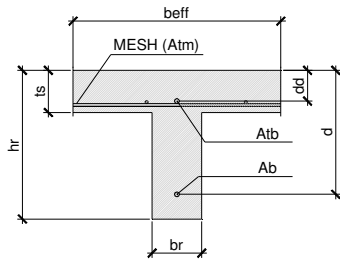
FLANGE IN TENSION (HOGGING)

Neutral axis position		$a =$	65,19 mm
Internal forces			
Distance b	$= c - a$	$b =$	2,8 mm
Distance c	$= h_r - d$	$c =$	68,0 mm
Distance e	$= h_r - a - d_d$	$e =$	199,8 mm
Compression	$= b_r \cdot 0,85 \cdot f_c \cdot a / 1000$	$C =$	110,8 kN
Tensile force of top reinforcement	$= A_t \cdot F_v / 1000$	$T_{rt} =$	107,6 kN
Stress of bottom reinforcement	$= 0,01 \cdot b / e \cdot 200000$	$\sigma_b =$	28,1 MPa
Tensile force of bottom reinforcement	$= \sigma_b \cdot A_b / 1000$	$T_{rb} =$	3,2 kN
Total tensile force	$= T_{rb} + T_{rt}$	$T =$	110,8 kN
Moment			
Moment from bottom reinforcement	$= (a / 2 + b) \cdot T_{rb} / 1000$	$M_{rb} =$	0,1 kNm
Moment from top reinforcement	$= T_{rt} \cdot (h_r - a / 2 - d_d) / 1000$	$M_{rt} =$	25,0 kNm
Total moment	$= M_{rt} + M_{rb}$	$M =$	25,1 kNm
		$\Phi =$	0,85
Design moment	$= \Phi \cdot M$	$\Phi M_n =$	21,4 kNm
			>
		$M^* =$	16,1 kNm OK

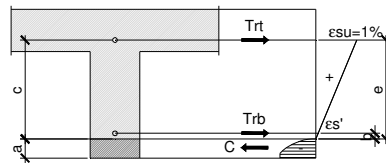
SHEAR STRENGTH OF HOGGING SECTION

Reinforcement ratio	$= A_t / (b_w \cdot [h_r - d_d])$	$\rho_w =$	0,00625
Material factor		$k_a =$	1,00
Shape factor (= 1 if $h < 400$)		$k_d =$	1,00
Shear strength without reinforcement	$= (0,07 + 10 \cdot \rho_w) \cdot \sqrt{f_c} \cdot b_w \cdot (h_r - d_d) / 1000$	$V_{b1} =$	20,4 kN
min value	$= 0,08 \cdot \sqrt{f_c} \cdot b_w \cdot (h_r - d_d) / 1000$	$V_{bmin} =$	12,3 kN
max value	$= 0,2 \cdot \sqrt{f_c} \cdot b_w \cdot (h_r - d_d) / 1000$	$V_{bmax} =$	30,8 kN
Base value for $d > 400$	$= k_a \cdot k_d \cdot \min([V_{bmax}], \max([V_{b1}], [V_{bmin}]))$	$V_{c400} =$	20,4 kN
Base value for $d = 200$	$= 0,17 k_a \sqrt{f_c} b_w (h_r - d_d) / 1000$	$V_{c200} =$	26,2 kN
Base value	$= V_{c400} + (V_{c200} - V_{c400}) / 200 (\min[400, [h_r - d_d]] - 200)$	$V_c =$	22,3 kN
		$\Phi =$	0,75
Hogging shear strength		$\Phi V_c =$	16,7 kN
			>
		$V^* =$	10,1 kN OK

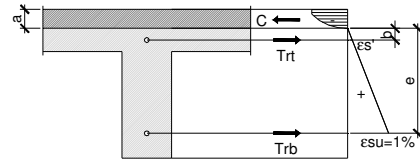
Load case 2: 2 m loss of edge bearing, cantilevering of edge beam at corner - detailed calculation
Check of beam: 180x300 - reinforced with 3 HD12 at top and 2 HD12 at bottom



HOGGING (FLANGE IN TENSION)



SAGGING (FLANGE IN COMPRESSION)

**GEOMETRY AND REINFORCEMENT**

Slab thickness	$t_s =$	85 mm
Web width	$b_r =$	180 mm
Web width for shear	$b_w =$	180 mm
Total height of section (web+slab)	$h_r =$	300 mm
Effective top width	$b_{eff} =$	480 mm
Effective depth of top reinf. (from top)	$d_d =$	35 mm
Effective depth of bot. reinf. (from top)	$d =$	232 mm
Top bar	3 HD 12	$A_{tb} =$ 339 mm ²
Top mesh		$A_{tm} =$ 146 mm ² /m
Total top reinforcement		$A_t =$ 409 mm ²
Bottom bar	2 HD 12	$A_b =$ 226 mm ²

FLANGE IN TENSION (HOGGING)

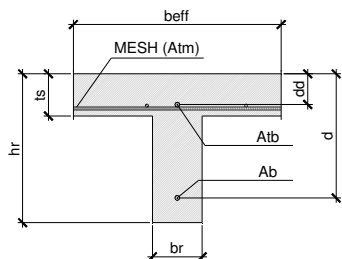
Neutral axis position	$a =$	67,37 mm
Internal forces		
Distance b	$b =$	0,6 mm
Distance c	$c =$	68,0 mm
Distance e	$e =$	197,6 mm
Compression	$C =$	206,1 kN
Tensile force of top reinforcement	$T_{rt} =$	204,7 kN
Stress of bottom reinforcement	$\sigma_b =$	6,4 MPa
Tensile force of bottom reinforcement	$T_{rb} =$	1,5 kN
Total tensile force	$T =$	206,1 kN
Moment		
Moment from bottom reinforcement	$M_{rb} =$	0,0 kNm
Moment from top reinforcement	$M_{rt} =$	47,3 kNm
Total moment	$M =$	47,4 kNm
	$\Phi =$	0,85
Design moment	$\Phi M_n =$	40,3 kNm
	$M^* =$	29,6 kNm OK

SHEAR STRENGTH OF HOGGING SECTION

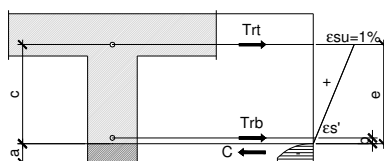
Reinforcement ratio	$\rho_w =$	0,00858
Material factor	$k_a =$	1,00
Shape factor (= 1 if $h < 400$)	$k_d =$	1,00
Shear strength without reinforcement	$V_{b1} =$	33,2 kN
min value	$V_{bmin} =$	17,1 kN
max value	$V_{bmax} =$	42,7 kN
Base value for $d > 400$	$V_{c400} =$	33,2 kN
Base value for $d = 200$	$V_{c200} =$	36,3 kN
Base value	$V_c =$	34,2 kN
	$\Phi =$	0,75
Hogging shear strength	$\Phi V_{ch} =$	25,7 kN
	$V^* =$	24,4 kN OK

Load case 3: 4 m loss of bearing, internal rib/beam - detailed calculation

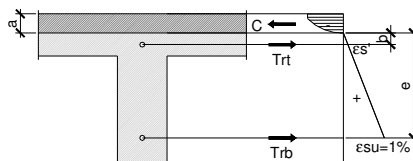
Check of rib/beam: 100x300 - reinforced with 0 HD12 at top and 1 HD12 at bottom



HOGGING (FLANGE IN TENSION)



SAGGING (FLANGE IN COMPRESSION)



GEOMETRY AND REINFORCEMENT

Slab thickness	$t_s =$	85 mm
Web width	$b_r =$	100 mm
Ribs average width for shear	$b_w =$	130 mm
Total height of section (web+slab)	$h_r =$	300 mm
Effective top width	$b_{eff} =$	700 mm
Effective depth of top reinf. (from top)	$d_d =$	35 mm
Effective depth of bot. reinf. (from top)	$d =$	232 mm
Top bar	0 HD 12	$A_{tb} =$ 0 mm ²
Top mesh		$A_{tm} =$ 146 mm ² /m
Total top reinforcement		$A_t =$ 102 mm ²
Bottom bar	1 HD 12	$A_b =$ 113 mm ²

FLANGE IN TENSION (HOGGING)

Neutral axis position	$a =$	44,33 mm
Internal forces		
Distance b	$b =$	23,7 mm
Distance c	$c =$	68,0 mm
Distance e	$e =$	220,7 mm
Compression	$C =$	75,4 kN
Tensile force of top reinforcement	$T_{rt} =$	51,1 kN
Stress of bottom reinforcement	$\sigma_b =$	214,5 MPa
Tensile force of bottom reinforcement	$T_{rb} =$	24,3 kN
Total tensile force	$T =$	75,4 kN
Moment		
Moment from bottom reinforcement	$M_{rb} =$	1,1 kNm
Moment from top reinforcement	$M_{rt} =$	12,4 kNm
Total moment	$M =$	13,5 kNm
Design moment	$\Phi M_n =$	11,5 kNm
	$M^* =$	8,0 kNm OK

Load case 3: 4 m loss of bearing, internal rib/beam - detailed calculation

Check of rib/beam: 100x300 - reinforced with 0 HD12 at top and 1 HD12 at bottom

FLANGE IN COMPRESSION (SAGGING)

Neutral axis position		$a =$	6,90 mm	
<i>Internal forces</i>				
Distance b	$= d_d - a$	$b =$	28,1 mm	
Distance c	$= d_d$	$c =$	35,0 mm	
Distance e	$= d - a$	$e =$	225,1 mm	
Compression	$= b_{eff} \cdot 0,85 \cdot f_c \cdot a / 1000$	$C =$	82,1 kN	
Tensile force of bottom reinforcement	$= A_b \cdot F_y / 1000$	$T_{rb} =$	56,5 kN	
Stress of top reinforcement	$= 0,01 \cdot b / e \cdot 200000$	$\sigma_t =$	249,7 MPa	
Tensile force of top reinforcement	$= \sigma_t \cdot A_t / 1000$	$T_{rt} =$	25,5 kN	
Total tensile force	$= T_{rt} + T_{rb}$	$T =$	82,1 kN	
<i>Moment</i>				
Moment from bottom reinforcement	$= (e + a / 2) \cdot T_{rb} / 1000$	$M_{rb} =$	12,9 kNm	
Moment from top reinforcement	$= T_{rt} \cdot (a / 2 + b) / 1000$	$M_{rt} =$	0,8 kNm	
Total moment	$= M_{rb} + M_{rt}$	$M =$	13,7 kNm	
		$\Phi =$	0,85	
Design moment	$= \Phi \cdot M$	$\Phi M_n =$	11,7 kNm	
			$>$	
		$M^* =$	8,0 kNm	OK

SHEAR STRENGTH OF HOGGING SECTION

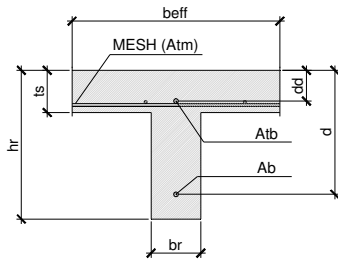
Reinforcement ratio	$= A_t / (b_w \cdot [h_r - d_d])$	$\rho_w =$	0,00297	
Material factor		$k_a =$	1,00	
Shape factor (= 1 if $h < 400$)		$k_d =$	1,00	
Shear strength without reinforcement	$= (0,07 + 10 \cdot \rho_w) \cdot \sqrt{f_c} \cdot b_w \cdot (h_r - d_d) / 1000$	$V_{b1} =$	15,4 kN	
min value	$= 0,08 \cdot \sqrt{f_c} \cdot b_w \cdot (h_r - d_d) / 1000$	$V_{bmin} =$	12,3 kN	
max value	$= 0,2 \cdot \sqrt{f_c} \cdot b_w \cdot (h_r - d_d) / 1000$	$V_{bmax} =$	30,8 kN	
Base value for $d > 400$	$= k_a \cdot k_d \cdot \min([V_{bmax}], \max([V_{b1}], [V_{bmin}]))$	$V_{c400} =$	15,4 kN	
Base value for $d = 200$	$= 0,17 k_a \sqrt{f_c} b_w (h_r - d_d) / 1000$	$V_{c200} =$	26,2 kN	
Base value	$= V_{c400} + (V_{c200} - V_{c400}) / 200 (\min[400, \{h_r - d_d\}] - 200)$	$V_c =$	18,9 kN	
		$\Phi =$	0,75	
Hogging shear strength	$= \Phi \cdot V_c$	$\Phi V_{ch} =$	14,2 kN	

SHEAR STRENGTH OF SAGGING SECTION

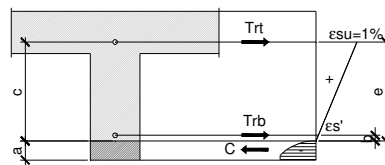
Reinforcement ratio	$= A_b / (b_w \cdot d)$	$\rho_w =$	0,00375	
Material factor		$k_a =$	1,00	
Shape factor (= 1 if $h < 400$)		$k_d =$	1,00	
Shear strength without reinforcement	$= (0,07 + 10 \cdot \rho_w) \cdot \sqrt{f_c} \cdot b_w \cdot d / 1000$	$V_{b1} =$	14,5 kN	
min value	$= 0,08 \cdot \sqrt{f_c} \cdot b_w \cdot d / 1000$	$V_{bmin} =$	10,8 kN	
max value	$= 0,2 \cdot \sqrt{f_c} \cdot b_w \cdot d / 1000$	$V_{bmax} =$	27,0 kN	
Base value for $d > 400$	$= k_a \cdot k_d \cdot \min([V_{bmax}], \max([V_{b1}], [V_{bmin}]))$	$V_{c400} =$	14,5 kN	
Base value for $d = 200$	$= 0,17 k_a \sqrt{f_c} b_w d / 1000$	$V_{c200} =$	22,9 kN	
Base value	$= V_{c400} + (V_{c200} - V_{c400}) / 200 (\min[400, \{d\}] - 200)$	$V_c =$	17,1 kN	
		$\Phi =$	0,75	
Sagging shear strength	$= \Phi \cdot V_c$	$\Phi V_{cs} =$	12,8 kN	
Shear strength of section	$= \min(\Phi V_{ch}, \Phi V_{cs})$	$\Phi V_c =$	12,8 kN	
			$>$	
		$V^* =$	8,6 kN	OK

Load case 4: 4 m loss of support of internal rib across Load Bearing internal beam - detailed calculation

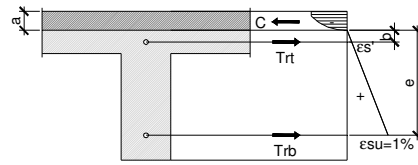
Check of rib: 100x300 - reinforced with 0 HD12 at top and 1 HD12 at bottom



HOGGING (FLANGE IN TENSION)



SAGGING (FLANGE IN COMPRESSION)



GEOMETRY AND REINFORCEMENT

Slab thickness		$t_s =$	85 mm
Web width		$b_r =$	100 mm
Ribs average width for shear		$b_w =$	130 mm
Total height of section (web+slab)		$h_r =$	300 mm
Effective top width		$b_{eff} =$	700 mm
Effective depth of top reinf. (from top)		$d_t =$	35 mm
Effective depth of bot. reinf. (from top)		$d =$	232 mm
Top bar	0 HD 12	$A_{tb} =$	0 mm ²
Top mesh		$A_{tm} =$	146 mm ² /m
Total top reinforcement		$A_t =$	102 mm ²
Bottom bar	1 HD 12	$A_b =$	113 mm ²

FLANGE IN TENSION (HOGGING)

Neutral axis position		$a =$	44,33 mm
Internal forces			
Distance b		$b =$	23,7 mm
Distance c	$= h_r - d$	$c =$	68,0 mm
Distance e	$= h_r - a - d_d$	$e =$	220,7 mm
Compression	$= b_r \cdot 0,85 \cdot f_c \cdot a / 1000$	$C =$	75,4 kN
Tensile force of top reinforcement	$= A_t \cdot F_v / 1000$	$T_{rt} =$	51,1 kN
Stress of bottom reinforcement	$= 0,01 \cdot b / e \cdot 200000$	$\sigma_b =$	214,5 MPa
Tensile force of bottom reinforcement	$= \sigma_b \cdot A_b / 1000$	$T_{rb} =$	24,3 kN
Total tensile force	$= T_{rb} + T_{rt}$	$T =$	75,4 kN
Moment			
Moment from bottom reinforcement	$= (a / 2 + b) \cdot T_{rt} / 1000$	$M_{rb} =$	1,1 kNm
Moment from top reinforcement	$= T_{rt} \cdot (h_r - a / 2 - d_d) / 1000$	$M_{rt} =$	12,4 kNm
Total moment	$= M_{rt} + M_{rb}$	$M =$	13,5 kNm
		$\Phi =$	0,85
Design moment	$= \Phi \cdot M$	$\Phi M_n =$	11,5 kNm
			>
		$M^* =$	7,7 kNm OK

Load case 4: 4 m loss of support of internal rib across Load Bearing internal beam - detailed calculation

Check of rib: 100x300 - reinforced with 0 HD12 at top and 1 HD12 at bottom

FLANGE IN COMPRESSION (SAGGING)

Neutral axis position		a =	6,90 mm
<i>Internal forces</i>			
Distance b	= $d_d - a$	b =	28,1 mm
Distance c	= d_d	c =	35,0 mm
Distance e	= $d - a$	e =	225,1 mm
Compression	= $b_{eff} \cdot 0,85 \cdot f_c \cdot a / 1000$	C =	82,1 kN
Tensile force of bottom reinforcement	= $A_b \cdot F_y / 1000$	T_{rb} =	56,5 kN
Stress of top reinforcement	= $0,01 \cdot b / e \cdot 200000$	σ_t =	249,7 MPa
Tensile force of top reinforcement	= $\sigma_t \cdot A_t / 1000$	T_{rt} =	25,5 kN
Total tensile force	= $T_{rt} + T_{rb}$	T =	82,1 kN
<i>Moment</i>			
Moment from bottom reinforcement	= $(e + a / 2) \cdot T_{rb} / 1000$	M_{rb} =	12,9 kNm
Moment from top reinforcement	= $T_{rt} \cdot (a / 2 + b) / 1000$	M_{rt} =	0,8 kNm
Total moment	= $M_{rb} + M_{rt}$	M =	13,7 kNm
Design moment	= $\Phi \cdot M$	ΦM_n =	11,7 kNm
			>
		M^* =	4,6 kNm OK

SHEAR STRENGTH OF HOGGING SECTION

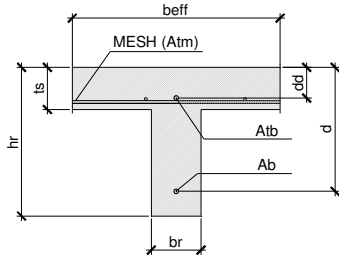
Reinforcement ratio	= $A_t / (b_w \cdot [h_r - d_d])$	p_w =	0,00297
Material factor		k_a =	1,00
Shape factor (= 1 if $h < 400$)		k_d =	1,00
Shear strength without reinforcement	= $(0,07 + 10 \cdot p_w) \cdot \sqrt{f_c} \cdot b_w \cdot (h_r - d_d) / 1000$	V_{b1} =	15,4 kN
min value	= $0,08 \cdot \sqrt{f_c} \cdot b_w \cdot (h_r - d_d) / 1000$	V_{bmin} =	12,3 kN
max value	= $0,2 \cdot \sqrt{f_c} \cdot b_w \cdot (h_r - d_d) / 1000$	V_{bmax} =	30,8 kN
Base value for $d > 400$	= $k_a \cdot k_d \cdot \min([V_{bmax}], \max([V_{b1}], [V_{bmin}]))$	V_{c400} =	15,4 kN
Base value for $d = 200$	= $0,17 k_a \sqrt{f_c} b_w (h_r - d_d) / 1000$	V_{c200} =	26,2 kN
Base value	= $V_{c400} + (V_{c200} - V_{c400}) / 200 (\min[400, \{h_r - d_d\}] - 200)$	V_c =	18,9 kN
		Φ =	0,75
Hogging shear strength	= $\Phi \cdot V_c$	ΦV_{ch} =	14,2 kN

SHEAR STRENGTH OF SAGGING SECTION

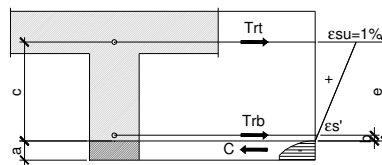
Reinforcement ratio	= $A_b / (b_w \cdot d)$	p_w =	0,00375
Material factor		k_a =	1,00
Shape factor (= 1 if $h < 400$)		k_d =	1,00
Shear strength without reinforcement	= $(0,07 + 10 \cdot p_w) \cdot \sqrt{f_c} \cdot b_w \cdot d / 1000$	V_{b1} =	14,5 kN
min value	= $0,08 \cdot \sqrt{f_c} \cdot b_w \cdot d / 1000$	V_{bmin} =	10,8 kN
max value	= $0,2 \cdot \sqrt{f_c} \cdot b_w \cdot d / 1000$	V_{bmax} =	27,0 kN
Base value for $d > 400$	= $k_a \cdot k_d \cdot \min([V_{bmax}], \max([V_{b1}], [V_{bmin}]))$	V_{c400} =	14,5 kN
Base value for $d = 200$	= $0,17 k_a \sqrt{f_c} b_w d / 1000$	V_{c200} =	22,9 kN
Base value	= $V_{c400} + (V_{c200} - V_{c400}) / 200 (\min[400, \{d\}] - 200)$	V_c =	17,1 kN
		Φ =	0,75
Sagging shear strength	= $\Phi \cdot V_c$	ΦV_{cs} =	12,8 kN
Shear strength of section	= $\min(\Phi V_{ch}, \Phi V_{cs})$	ΦV_c =	12,8 kN
			>
		V^* =	5,6 kN OK

Load case 5: 4 m loss of bearing, edge beam - detailed calculation

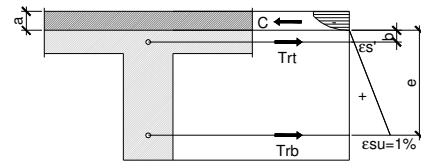
Check of beam: 180x300 - reinforced with 2 HD12 at top and 2 HD12 at bottom



HOGGING (FLANGE IN TENSION)



SAGGING (FLANGE IN COMPRESSION)



GEOMETRY AND REINFORCEMENT

Slab thickness	$t_s =$	85 mm
Web width	$b_r =$	180 mm
Web width for shear	$b_w =$	180 mm
Total height of section (web+slab)	$h_r =$	300 mm
Effective top width	$b_{eff} =$	480 mm
Effective depth of top reinf. (from top)	$d_d =$	35 mm
Effective depth of bot. reinf. (from top)	$d =$	232 mm
Top bar	2 HD 12	$A_{tb} =$ 226 mm ²
Top mesh		$A_{tm} =$ 146 mm ² /m
Total top reinforcement		$A_t =$ 296 mm ²
Bottom bar	2 HD 12	$A_b =$ 226 mm ²

FLANGE IN TENSION (HOGGING)

Neutral axis position	$a =$	56,54 mm
Internal forces		
Distance b	$b =$	11,5 mm
Distance c	$c =$	68,0 mm
Distance e	$e =$	208,5 mm
Compression	$C =$	173,0 kN
Tensile force of top reinforcement	$T_{rt} =$	148,1 kN
Stress of bottom reinforcement	$\sigma_b =$	110,0 MPa
Tensile force of bottom reinforcement	$T_{rb} =$	24,9 kN
Total tensile force	$T =$	173,0 kN
Moment		
Moment from bottom reinforcement	$M_{rb} =$	1,0 kNm
Moment from top reinforcement	$M_{rt} =$	35,1 kNm
Total moment	$M =$	36,1 kNm
Design moment	$\Phi M_n =$	30,6 kNm
	$M^* =$	19,1 kNm OK

Load case 5: 4 m loss of bearing, edge beam - detailed calculation

Check of beam: 180x300 - reinforced with 2 HD12 at top and 2 HD12 at bottom

FLANGE IN COMPRESSION (SAGGING)

Neutral axis position		a =	19,24 mm
<i>Internal forces</i>			
Distance b	= $d_d - a$	b =	15,8 mm
Distance c	= d_d	c =	35,0 mm
Distance e	= $d - a$	e =	212,8 mm
Compression	= $b_{eff} \cdot 0,85 \cdot f_c \cdot a / 1000$	C =	157,0 kN
Tensile force of bottom reinforcement	= $A_b \cdot F_v / 1000$	T_{tb} =	113,1 kN
Stress of top reinforcement	= $0,01 \cdot b / e \cdot 200000$	σ_t =	148,2 MPa
Tensile force of top reinforcement	= $\sigma_t \cdot A_t / 1000$	T_{tt} =	43,9 kN
Total tensile force	= $T_{tt} + T_{tb}$	T =	157,0 kN
<i>Moment</i>			
Moment from bottom reinforcement	= $(e + a / 2) \cdot T_{tb} / 1000$	M_{tb} =	25,2 kNm
Moment from top reinforcement	= $T_{tt} \cdot (a / 2 + b) / 1000$	M_{tt} =	1,1 kNm
Total moment	= $M_{tb} + M_{tt}$	M =	26,3 kNm
		Φ =	0,85
Design moment	= $\Phi \cdot M$	ΦM_n =	22,3 kNm
			>
		M^* =	12,7 kNm OK

SHEAR STRENGTH OF HOGGING SECTION

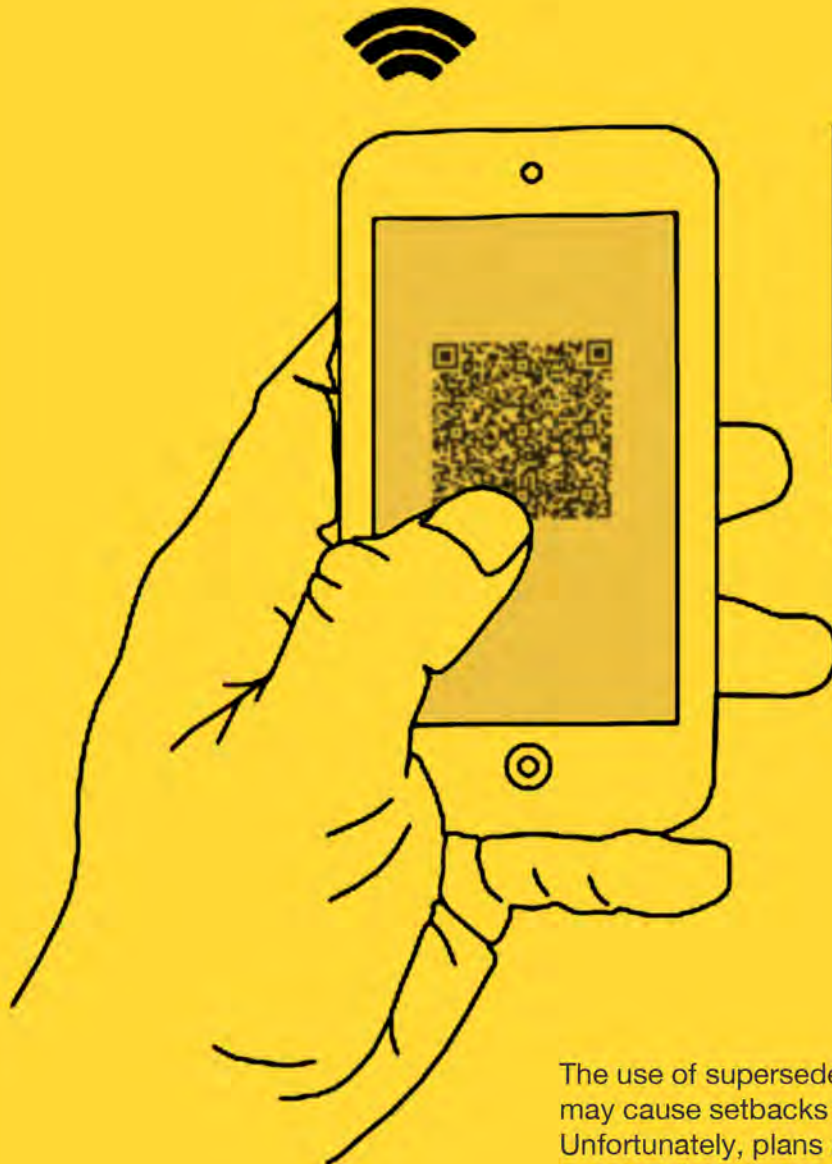
Reinforcement ratio	= $A_t / (b_w \cdot [h_r - d_d])$	p_w =	0,00621
Material factor		k_a =	1,00
Shape factor (= 1 if $h < 400$)		k_d =	1,00
Shear strength without reinforcement	= $(0,07 + 10 \cdot p_w) \cdot \sqrt{f_c} \cdot b_w \cdot (h_r - d_d) / 1000$	V_{b1} =	28,2 kN
min value	= $0,08 \cdot \sqrt{f_c} \cdot b_w \cdot (h_r - d_d) / 1000$	V_{bmin} =	17,1 kN
max value	= $0,2 \cdot \sqrt{f_c} \cdot b_w \cdot (h_r - d_d) / 1000$	V_{bmax} =	42,7 kN
Base value for $d > 400$	= $k_a \cdot k_d \cdot \min([V_{bmax}], \max([V_{b1}], [V_{bmin}]))$	V_{c400} =	28,2 kN
Base value for $d = 200$	= $0,17 k_a \sqrt{f_c} b_w (h_r - d_d) / 1000$	V_{c200} =	36,3 kN
Base value	= $V_{c400} + (V_{c200} - V_{c400}) / 200 (\min[400, \{h_r - d_d\}] - 200)$	V_c =	30,8 kN
		Φ =	0,75
Hogging shear strength	= $\Phi \cdot V_c$	ΦV_{ch} =	23,1 kN

SHEAR STRENGTH OF SAGGING SECTION

Reinforcement ratio	= $A_b / (b_w \cdot d)$	p_w =	0,00542
Material factor		k_a =	1,00
Shape factor (= 1 if $h < 400$)		k_d =	1,00
Shear strength without reinforcement	= $(0,07 + 10 \cdot p_w) \cdot \sqrt{f_c} \cdot b_w \cdot d / 1000$	V_{b1} =	23,2 kN
min value	= $0,08 \cdot \sqrt{f_c} \cdot b_w \cdot d / 1000$	V_{bmin} =	14,9 kN
max value	= $0,2 \cdot \sqrt{f_c} \cdot b_w \cdot d / 1000$	V_{bmax} =	37,4 kN
Base value for $d > 400$	= $k_a \cdot k_d \cdot \min([V_{bmax}], \max([V_{b1}], [V_{bmin}]))$	V_{c400} =	23,2 kN
Base value for $d = 200$	= $0,17 k_a \sqrt{f_c} b_w d / 1000$	V_{c200} =	31,7 kN
Base value	= $V_{c400} + (V_{c200} - V_{c400}) / 200 (\min[400, \{d\}] - 200)$	V_c =	29,5 kN
		Φ =	0,75
Sagging shear strength	= $\Phi \cdot V_c$	ΦV_{cs} =	22,1 kN
Shear strength of section	= $\min(\Phi V_{ch}, \Phi V_{cs})$	ΦV_c =	22,1 kN
			>
		V^* =	19,1 kN OK

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SECTION 3

Truss Details & Bracing Details

(Include Fixings of Gib & Ecoply)

- Design IT Calcs
- Hyspan etc.

AS BUILT TRUSS LAYOUT
REQUIRED - This must be received by the Building Unit AT
LEAST 10 WORKING DAYS PRIOR to the Structure
Pre-Roof Pre-Wrap inspection.

Truss "As-Build" designs may be sent to
Buildinginfo@wmk.govt.nz



Correspondence from :

AUCKLAND
40 Neales Road, East Tamaki 2013
PO Box 58-014, Botany 2163
Phone: 09 274 7109
Fax: 09 274 7100

CHRISTCHURCH
14 Pilkington Way, Wigram 8042
PO Box 8387, Riccarton 8440
Phone: 03 348 8691
Fax: 03 348 0314

www.mitekzn.co.nz

Printed: 13:44:44 12 Sep 2017

MiTek 20/20 Engineering 4.7.91.0

PRODUCER STATEMENT for MiTek 20/20[®] TRUSS DESIGN - Version 4.7

ISSUED BY:

MiTek New Zealand Limited

TO:

Placemakers National Estimating Unit (NEU)

IN RESPECT OF:

MiTek[®] Truss Designs

**AS BUILT TRUSS LAYOUT
REQUIRED - This must be received by the Building Unit AT
LEAST 10 WORKING DAYS PRIOR to the Structure
Pre-Roof Pre-Wrap inspection.**

**Truss "As-Build" designs may be sent to
Buildinginfo@wmk.govt.nz**

This producer statement covers the MiTek 20/20[®] truss design and the structural performance of the GANG-NAIL[®] connector plate for the job reference **17-34433** and may be used by a Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

The MiTek 20/20[®] truss design program has been developed by MiTek New Zealand Limited for the design of MiTek[®] timber roof, floor and attic trusses in New Zealand. The truss designs computed by MiTek 20/20[®] are prepared using sound and widely accepted engineering principles, and in accordance with compliance documents of the New Zealand Building Code and Verification Method B1/VM1; and internationally accepted standard ANSI/TPI 1 - 2002 as an alternative solution, to satisfy the requirements of Clauses B1 and B2 of the New Zealand Building Code.

On behalf of MiTek New Zealand Limited, and subject to:

- i) All proprietary products meeting their performance specification requirements
- ii) The provision of adequate roof bracing and overall building stability
- iii) Correct selection and placement of GANG-NAIL connector plates
- iv) Correct input of Truss Design Data as shown in the Fabricator Design Statement for this job
- v) The design being undertaken by the accredited fabricator under the terms of the software licence
- vi) Timber is graded to the requirements of NZS 3603:1993
- vii) Minimum timber treatment for these MiTek[®] trusses shall be in accordance with B2/AS1 Table 1A and the relevant sections of NZS 3602:2003

I believe on reasonable grounds that the trusses, if constructed in accordance with the MiTek 20/20[®] truss design and shop drawings, will comply with the relevant provisions of the New Zealand Building Code.

MiTek New Zealand Limited holds a current policy of Professional Indemnity Insurance no less than \$500,000.

On behalf of MiTek New Zealand Limited,

Date: Tuesday, 12 September 2017

In Ling Ng, BE (Hons), CPEng, IntPE, MIPENZ (ID: 146585)

TECHNICAL SERVICES MANAGER, MiTek New Zealand Limited

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
171675 10/11/2017 nicolah

Job: 17-34433	Client: G.J. Gardner Homes	Site: J & K Foote 5 Catchpole Place Woodend Canterbury	Fabricator Design Statement : Page 1
Description: Building Consent No.: MiTek 20/20 Engineering 4.7.91.0	Phone:	BC171675 Phone:	Printed: 13:44:44 12 Sep 2017
Consent Issued BC171675 MiTek New Zealand Limited			

MITEK FABRICATOR DESIGN STATEMENT

This statement is issued by MiTek accredited fabricator **Placemakers National Estimating Unit (NEU)**, being licensed to use the MiTek 20/20® software, to the client listed above and may be used by the Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

MiTek 20/20® TRUSS DESIGN DATA

The MiTek 20/20® computer design for this job is based on the following design parameters entered into the program. The Fabricator shall ensure that these job details are current and relevant to the project for the design of the MiTek® trusses.

Job Details		Importance Level : 2	Design Working Life : 50 years
Roof Truss			
Timber Group:	NEU-H1.2	Pitch:	25.000 deg
Roof		Ceiling	
Material:	Metal Tiles	Material:	Metal battens fixed to BC
Dead Load:	0.210 kPa	Dead Load:	0.200 kPa
Restraints:	400 mm centres	Restraints:	600 mm centres
Live Load:	Q _{ur} = 0.250 kPa	Live Load:	Q _c = 1.400 kN
	Q _c = 1.100 kN		
		Nominal Overhang:	600 mm
		Wind	
		Area:	High (44.0 m/s)
		Pressure Coeff:	C _{pe} = varies; C _{pi} = -0.30, 0.20
		Snow	
		Location:	Woodend (N4) at 100 m
		Open Ground Load:	0.900 kPa
		Basic Roof Load:	0.441 kPa

The minimum timber treatment for these MiTek® trusses shall be in accordance with B2/AS1 Table 1A and the relevant sections of NZS 3602:2003. The timber for these MiTek® trusses shall be graded to the requirements of NZS 3603:1993. Proprietary fixings and timber connectors shall be selected in accordance with NZS3604:2011 Section 4 - Durability.

MiTek® Truss List

Legend: * = detail only, ? = input only, ✕ = failed design, Ø = non certified, Unmarked trusses = designed successfully, LB = lateral bracing required
GB = gable brace required

Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)	Truss	Qty	Span (mm)	Pitch (deg)	Spacing (mm)
*HB01	1	2364	18.249	900	V01	1	1788	25.000	900	T01A	1	4178	25.000	900
*HB02	1	7920	18.249	900	V02	1	920	25.000	900	T02A	1	7507	25.000	900
*HB03	1	2481	18.249	900	V03	1	1850	25.000	900	GT02	1	6843	25.000	900
*HB04	1	2208	18.249	900	V04	1	735	25.000	900	J02	1	2301	25.000	900
*HB05	1	2425	18.249	900	V05	2	1635	25.000	900	J06	1	2268	25.000	900
*HB06	1	6602	18.249	900	V06	1	691	25.000	900	J08	1	2502	25.000	900
*HB07	2	5660	18.249	900	V07	1	1840	25.000	900	J10	1	2425	25.000	900
*HB08	1	5551	18.249	900	V08	1	972	25.000	900	J12	1	2675	25.000	900
*HB09	2	4632	18.249	900	V09	1	2578	25.000	900	J02A	1	2301	25.000	900
J01	1	3201	25.000	900	*HB08A	1	5551	18.249	900	J06A	1	2268	25.000	900
J03	1	1401	25.000	900	J01A	1	3201	25.000	900	J08A	1	2502	25.000	900
J07	1	1368	25.000	900	J01B	1	3201	25.000	900	J08B	1	2502	25.000	900
J09	1	1602	25.000	900	J01D	1	3201	25.000	900	J08C	1	2502	25.000	900
J11	1	1525	25.000	900	J03A	1	1401	25.000	900	J08D	1	2502	25.000	900
J13	1	1775	25.000	900	J07A	1	1368	25.000	900	J10A	1	2425	25.000	900
*R01	1	1114	25.000	900	J09A	1	1602	25.000	900	J10B	1	2425	25.000	900
*R02	8	913	25.000	900	J09B	1	1602	25.000	900	J10C	1	2425	25.000	900
*R03	1	900	25.000	900	J09C	1	1602	25.000	900	J10D	1	2425	25.000	900
*R04	1	1081	25.000	900	J11A	1	1525	25.000	900	J12A	1	2675	25.000	900
*R05	1	1315	25.000	900	J11B	1	1525	25.000	900	J12B	1	2675	25.000	900
*R06	1	1238	25.000	900	J11C	1	1525	25.000	900	GT04	1	4969	25.000	900
*R07	1	1488	25.000	900	J13A	1	1775	25.000	900	J01C	1	3201	25.000	900
T01	1	4178	25.000	900	J13B	1	1775	25.000	900	J05	1	3168	25.000	900
T02	3	7507	25.000	900	J13C	1	1775	25.000	900	TG02	1	6844	25.000	900
T03	1	6844	25.000	900	*R02A	8	913	25.000	900	TG03	1	6693	25.000	900
T04	2	6603	25.000	900	R03A	1	900	25.000	900	GT01	1	6717	25.000	900
T05	2	4303	25.000	900	*R05A	1	1315	25.000	900	J04	1	3171	25.000	900
TR01	1	6717	25.000	900	*R06A	1	1238	25.000	900	GT03	1	6603	25.000	900
TR02	1	7507	25.000	900	*R07A	1	1488	25.000	900	TG01	1	8182	25.000	900

Total quantity : 108

**AS BUILT TRUSS LAYOUT
REQUIRED - This must be received by the Building Unit AT
LEAST 10 WORKING DAYS PRIOR to the Structure
Pre-Roof Pre-Wrap inspection.**

Truss "As-Build" designs may be sent to
Buildinginfo@wmk.govt.nz

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
171675 10/11/2017 nicolah

The computer design input has been carried out by:

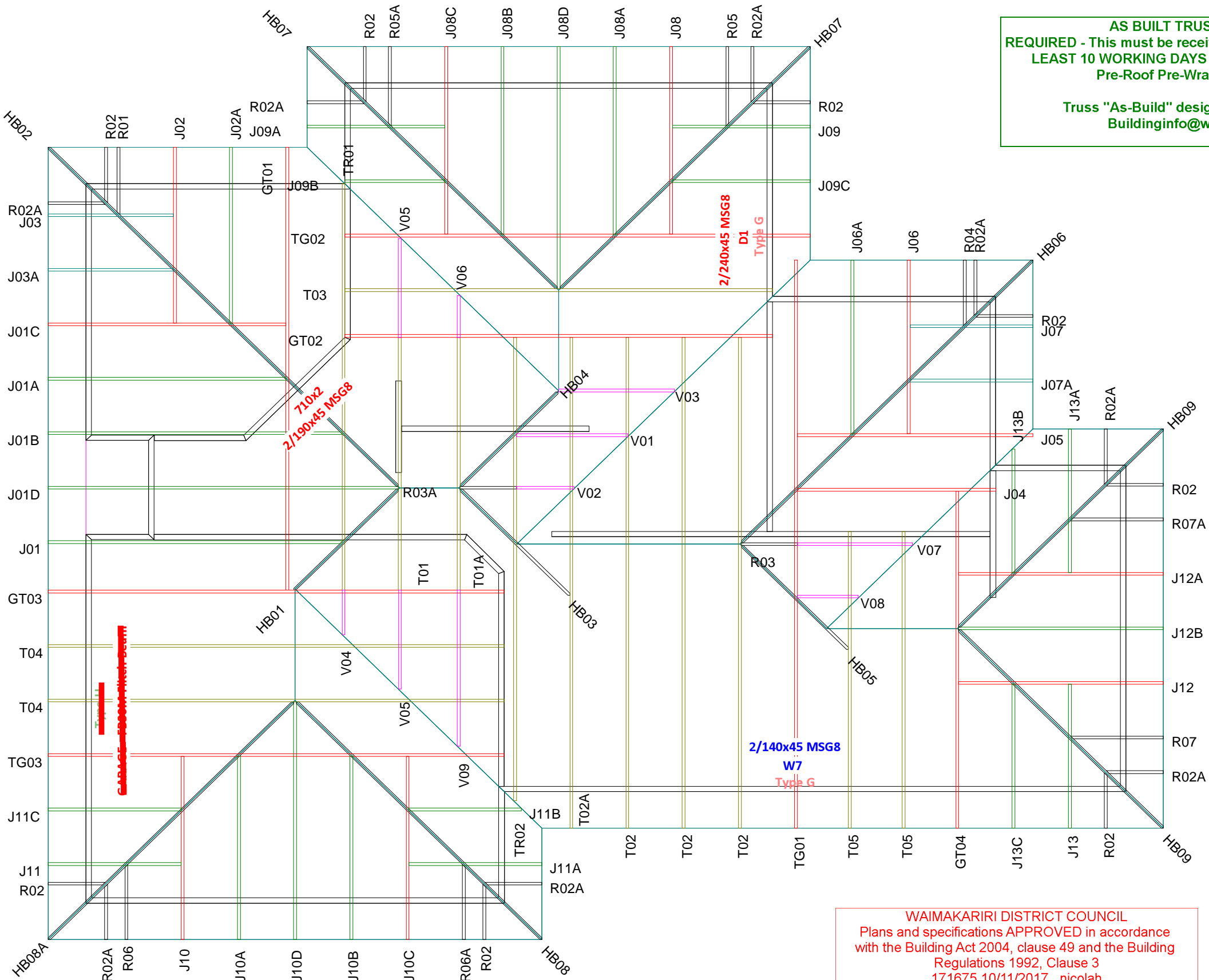
Signed: 

Name of Detailer: Isaac Arapai

Date: ...Tuesday, 12 September 2017....

Qualifications and Title: MiTek 20/20 COC Candidate No. 10424

On behalf of: Placemakers National Estimating Unit (NEU)



AS BUILT TRUSS LAYOUT
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Pre-Roof Pre-Wrap inspection.

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See Sheet 4 of plans for Garage
door lintel

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
171675 10/11/2017 nicolah



Site Address :
J & K Foote
5 Catchpole Place
Woodend
Canterbury

Sheet Title :
For Building Consent
Buildable Truss Layout

Date : 12 Sep,2017
Scale : 1: 100

Drawn : Isaac Arapai
System : MiTek 20/20

Job Details:
Roof Pitch : 25.000 Deg
Roof Material : Metal Tiles
Ceiling Material : Metal battens fixed to BC
Wind Zone : High
Roof Snow Load: 0.441 kPa

Truss Centres : 900 mm
Roof Live Load : 0.250kPa
Floor Live Load : kPa
Wind Speed : 44.0 m/s

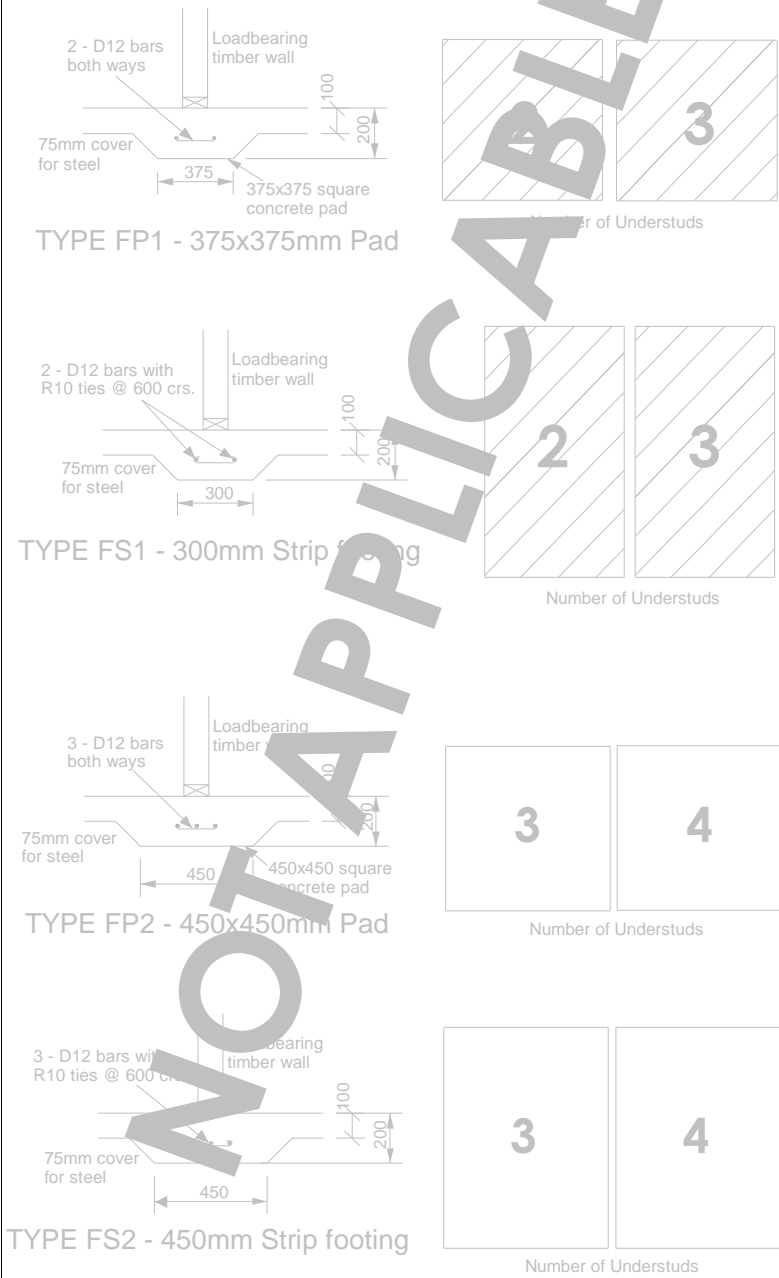


Job Title :
17-34433

Sheet :
1

Revision Number :

Slab Thickening Details



NOTES:

All point loads exceeding 8.0kN are indicated.

All walls shown to be considered load bearing.

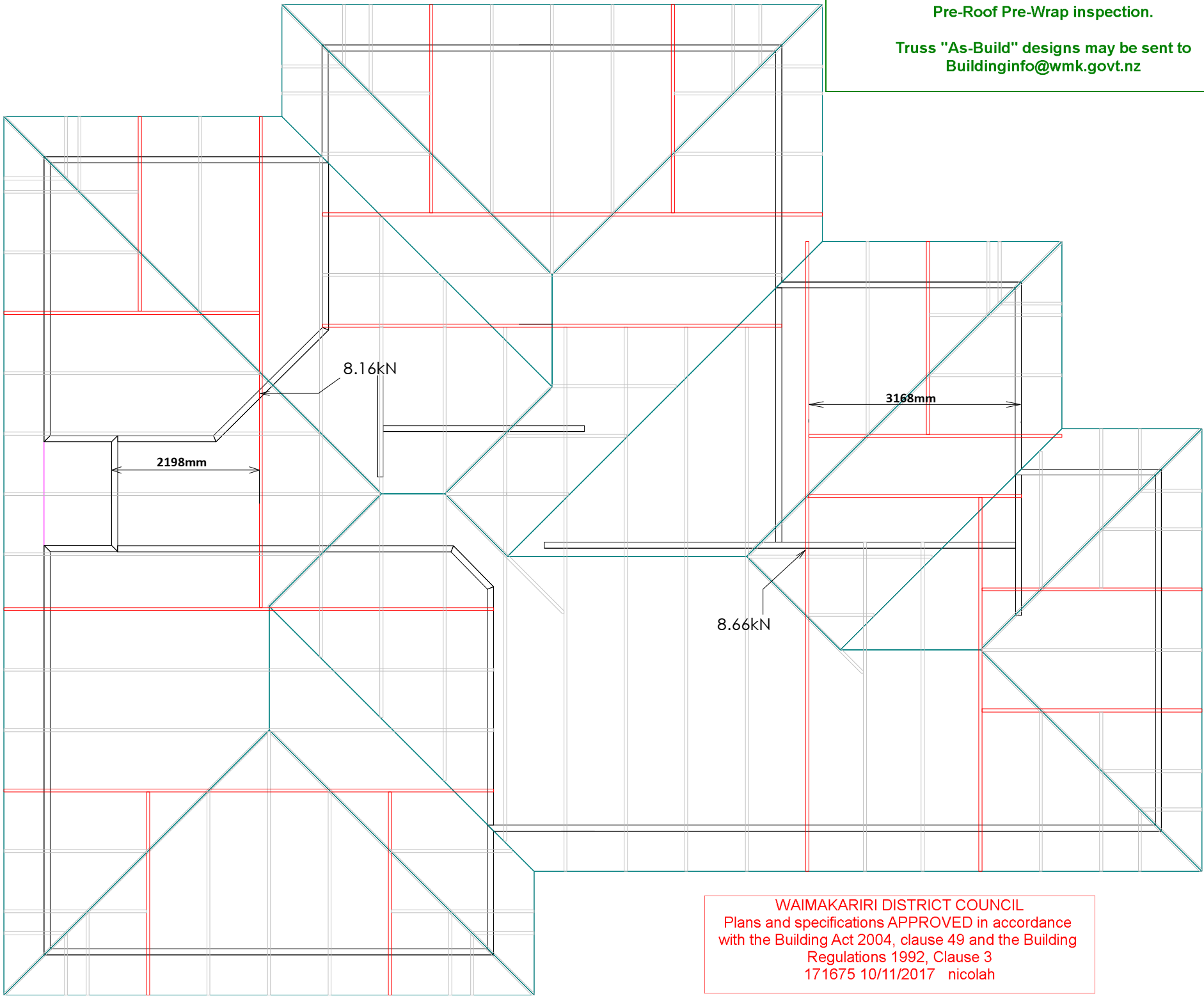
Refer to Rib-raft floor design for slab thickening.

Consent Issued BC171675
Layout is null and void if trusses not supplied by PlaceMakers

BC171675

AS BUILT TRUSS LAYOUT
REQUIRED - This must be received by the Building Unit AT
LEAST 10 WORKING DAYS PRIOR to the Structure
Pre-Roof Pre-Wrap inspection.

Truss "As-Built" designs may be sent to
Buildinginfo@wmk.govt.nz



WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
171675 10/11/2017 nicolah



Site Address :
J & K Foote
5 Catchpole Place
Woodend
Canterbury

Sheet Title :
For Building Consent
Slab Thickening

Date : 12 Sep,2017
Scale : 1: 100

Drawn : Isaac Arapai
System : MiTek 20/20

Job Details:
Roof Pitch : 25.000 Deg
Roof Material : Metal Tiles
Ceiling Material : Metal battens fixed to BC
Wind Zone : High
Roof Snow Load: 0.441 kPa

Truss Centres : 900 mm
Roof Live Load : 0.250kPa
Floor Live Load : kPa
Wind Speed : 44.0 m/s



Job Title :
17-34433

Sheet :
2

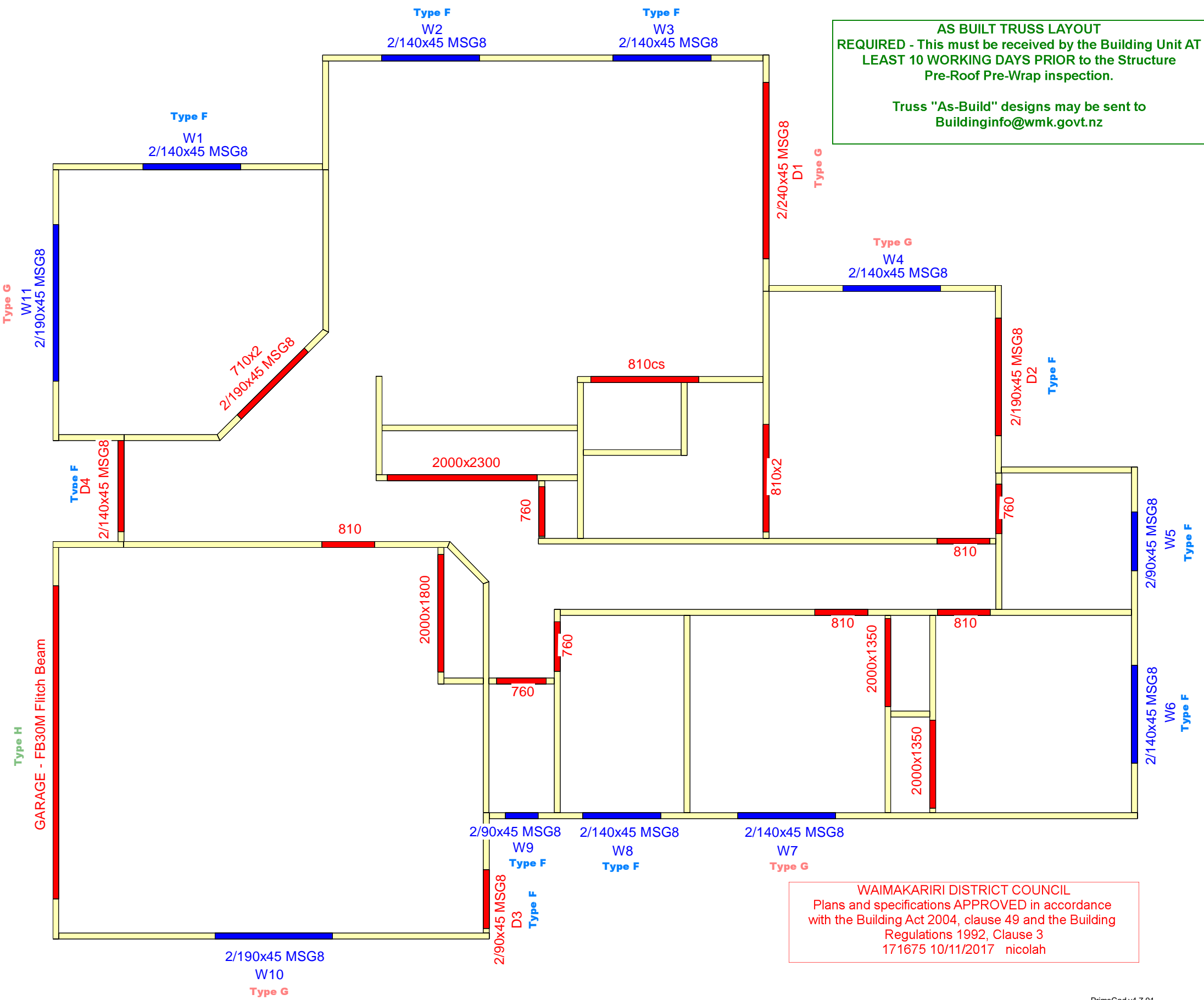
Revision Number :

Lintel Fixing Details

- TYPE E
1.4kN
- TYPE F
4.0kN
- TYPE G
7.5kN
- TYPE H
13.5kN

NOTES:
Refer to:
Lintel Fixing Schedule 10/2011
pages 68 & 69, Structural Fixings
On-site Guide for Building Code
Compliance 2012 Edition

(Alternative to NZS 3604:2011
Table 8.14 & Figure 8.12)

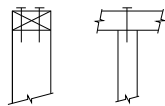


Stud to top plate fixing details

Type A is minimum fixing required unless specified otherwise

FIXING TYPE A
0.7kN

2/90x3.33 plain steel wire
nails driven vertically into
stud.

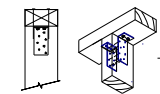


FIXING TYPE B
4.7kN

2 x 90mm x 3.15 dia. plain steel wire nails driven
vertically into stud.

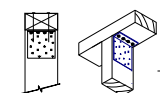
AND

Plus 2x LUMBERLOK
CPC40



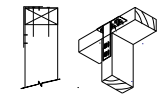
OR

Plus LUMBERLOK
6 kN Stud Anchor
(CPC80)



OR

Plus LUMBERLOK
Stud Strap
(One face only)



Recommended for
internal wall options to
avoid lining issues.

NOTES:

Refer to:
LUMBERLOK Wall Fixing Chart - Stud to Top Plate
Fixing Schedule 09/2011

(Alternative to NZS3604:2011 Table 8.18)

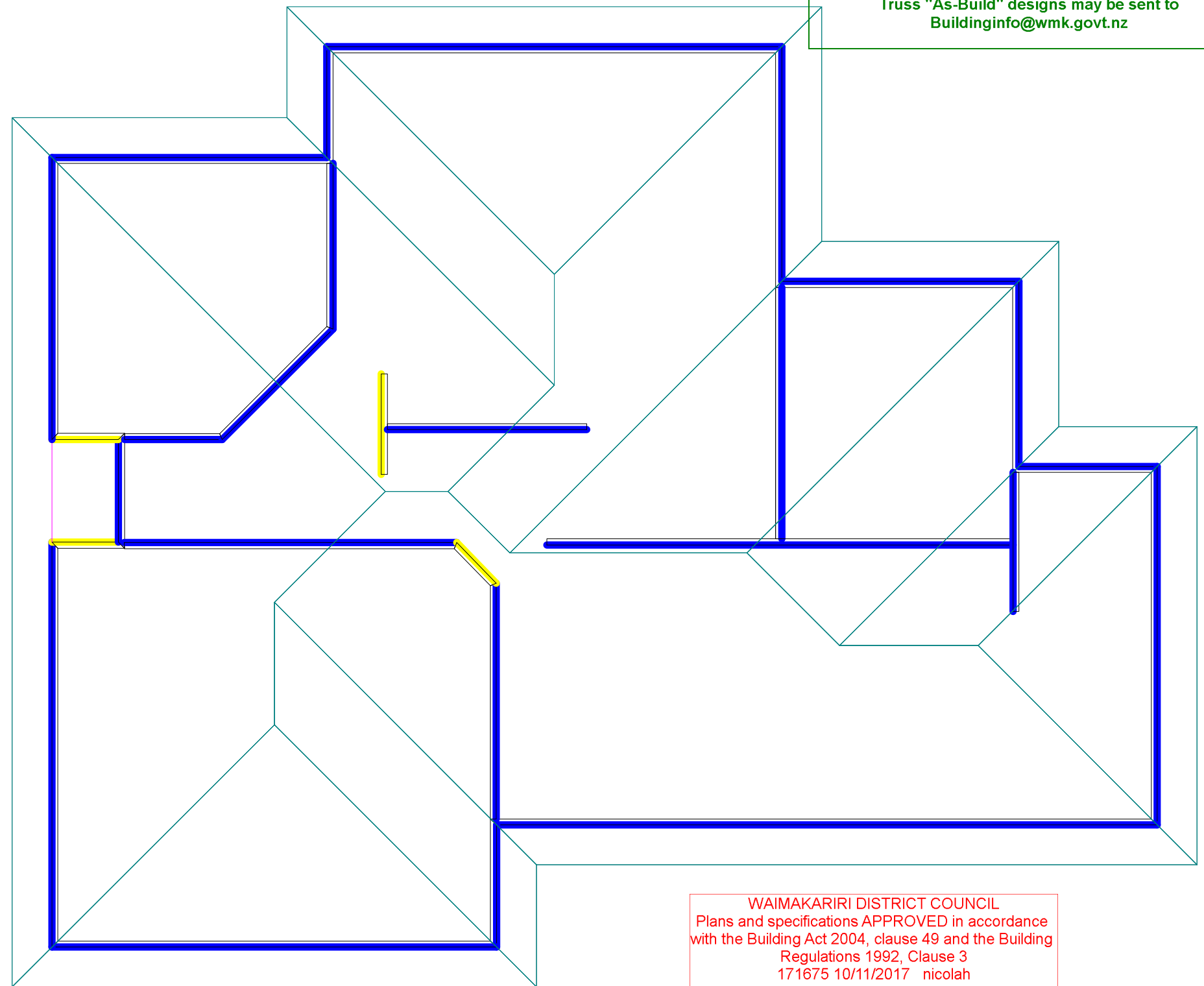
Consent Issued BC171675

Layout is null and void if trusses not supplied by PlaceMakers

BC171675

**AS BUILT TRUSS LAYOUT
REQUIRED - This must be received by the Building Unit AT
LEAST 10 WORKING DAYS PRIOR to the Structure
Pre-Roof Pre-Wrap inspection.**

Truss "As-Build" designs may be sent to
Buildinginfo@wmk.govt.nz



WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
171675 10/11/2017 nicolah

PlaceMakers
Know how. Can do.

Site Address :
J & K Foote
5 Catchpole Place
Woodend
Canterbury

Sheet Title :
**For Building Consent
Stud To Top Plate Fixing**

Date : 12 Sep,2017 Drawn : Isaac Arapai
Scale : 1: 100 System : MiTek 20/20

Job Details:
Roof Pitch : 25.000 Deg
Roof Material : Metal Tiles
Ceiling Material : Metal battens fixed to BC
Wind Zone : High
Roof Snow Load: 0.441 kPa

Truss Centres : 900 mm
Roof Live Load : 0.250kPa
Floor Live Load : kPa
Wind Speed : 44.0 m/s

PrimeCad v4.7.91
MiTek

Job Title :
17-34433
Sheet :
4
Revision Number :

Truss Fixings

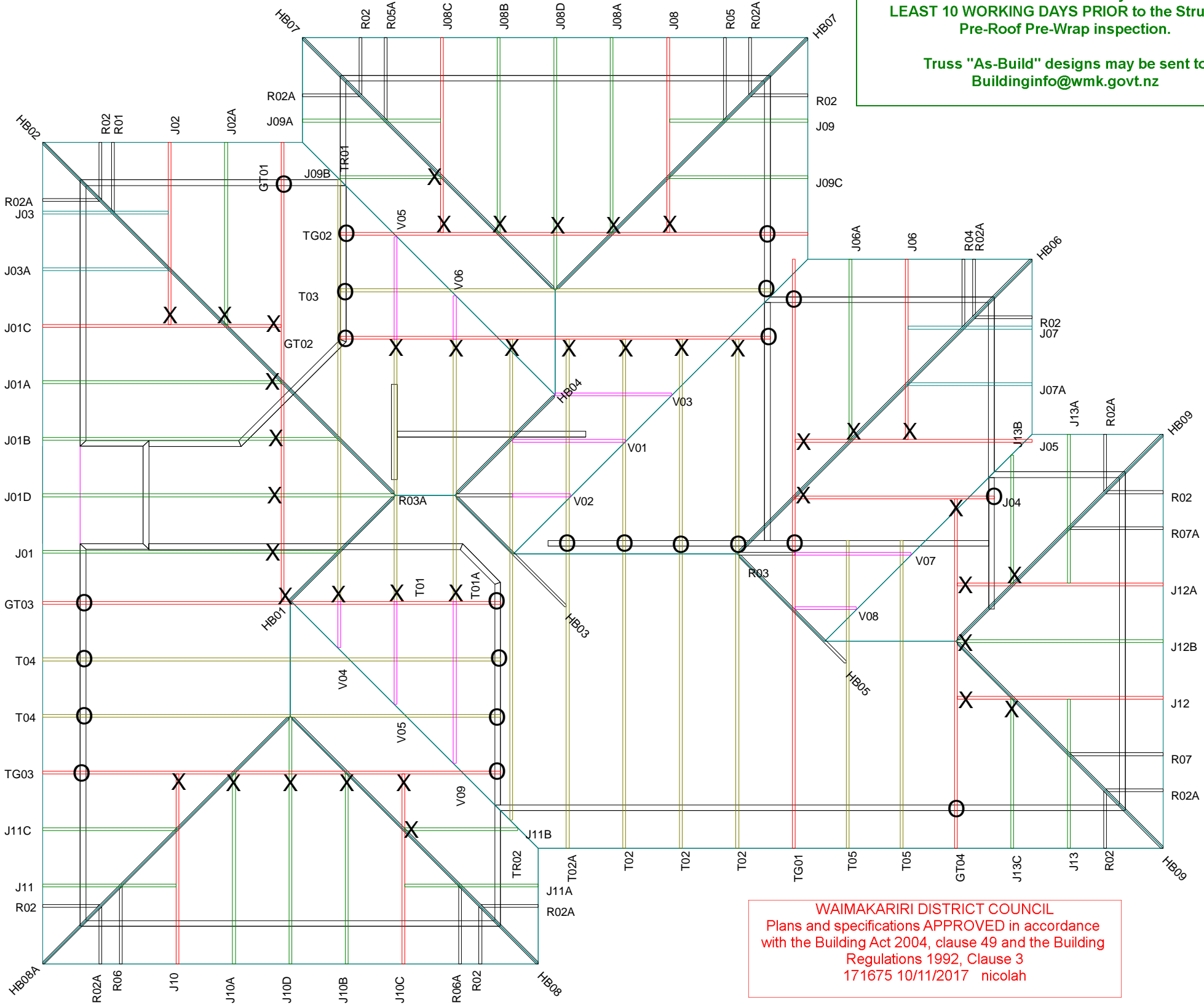
- X - LUMBERLOK JH47x90 Joist Hanger
- Z - LUMBERLOK JH47x120 Joist Hanger
- P - LUMBERLOK JH47x190 Joist Hanger
- E - LUMBERLOK JH95x165 Joist Hanger
- O - Pair of LUMBERLOK CT200 Ceiling Ties
- H - LUMBERLOK CT400 Cyclone Tie
- B - LUMBERLOK CT600 Cyclone Tie
- M - Pair of LUMBERLOK Multi Grips
- NP - LUMBERLOK Nailon Plate
- N - LUMBERLOK N21 Diagonal Cleat
- W - Pair of LUMBERLOK CPC40 Cleats
- K - LUMBERLOK TTP 16kN Truss to Top Plate set
- G - LUMBERLOK TTP 9kN Truss to Top Plate set

NOTES:

All other areas must have at the minimum
2/ 90x3.15mm skew nails + 2 wire dogs (4.7kN)
for truss to top plate connections.

Refer to:
LUMBERLOK Timber Connectors Characteristic
Loadings Data brochure 03/4

Consent Issued BC171675
Layout is null and void if trusses not supplied by PlaceMakers



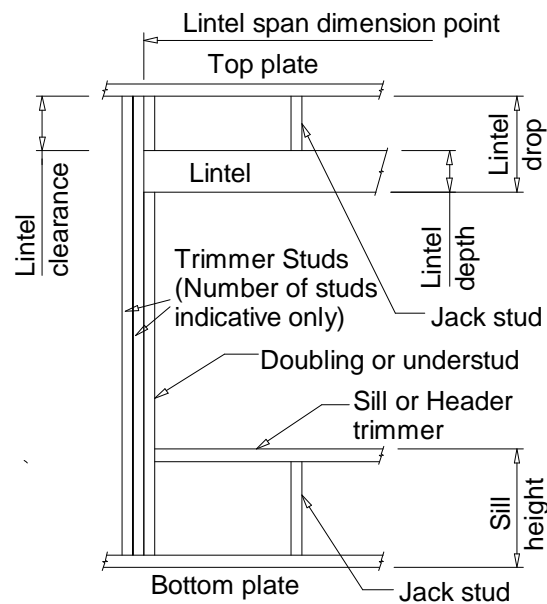
LINTEL FIXING OPTIONS

LINTEL FIXING SCHEDULE ALTERNATIVE TO TABLE 8.14 & FIGURE 8.12 NZS 3604:2011

NOTE:

- ★ All fixings are designed for vertical loads only. Dead loads include the roof weight and standard ceiling weight of 0.20 kPa.
- ★ Refer to Table 8.19 NZS 3604:2011 for nailing schedule to resist horizontal loads.
- ★ These fixings assume the correct choice of rafter/truss to top plate connections have been made.
- ★ All fixings assume bottom plate thickness of 45mm maximum. Note: TYLOK options on timber species.
- ★ Wall framing arrangements under girder trusses are not covered in this schedule.
- ★ All timber selections are as per NZS 3604:2011

DEFINITIONS



Lintel Supporting Girder Trusses:

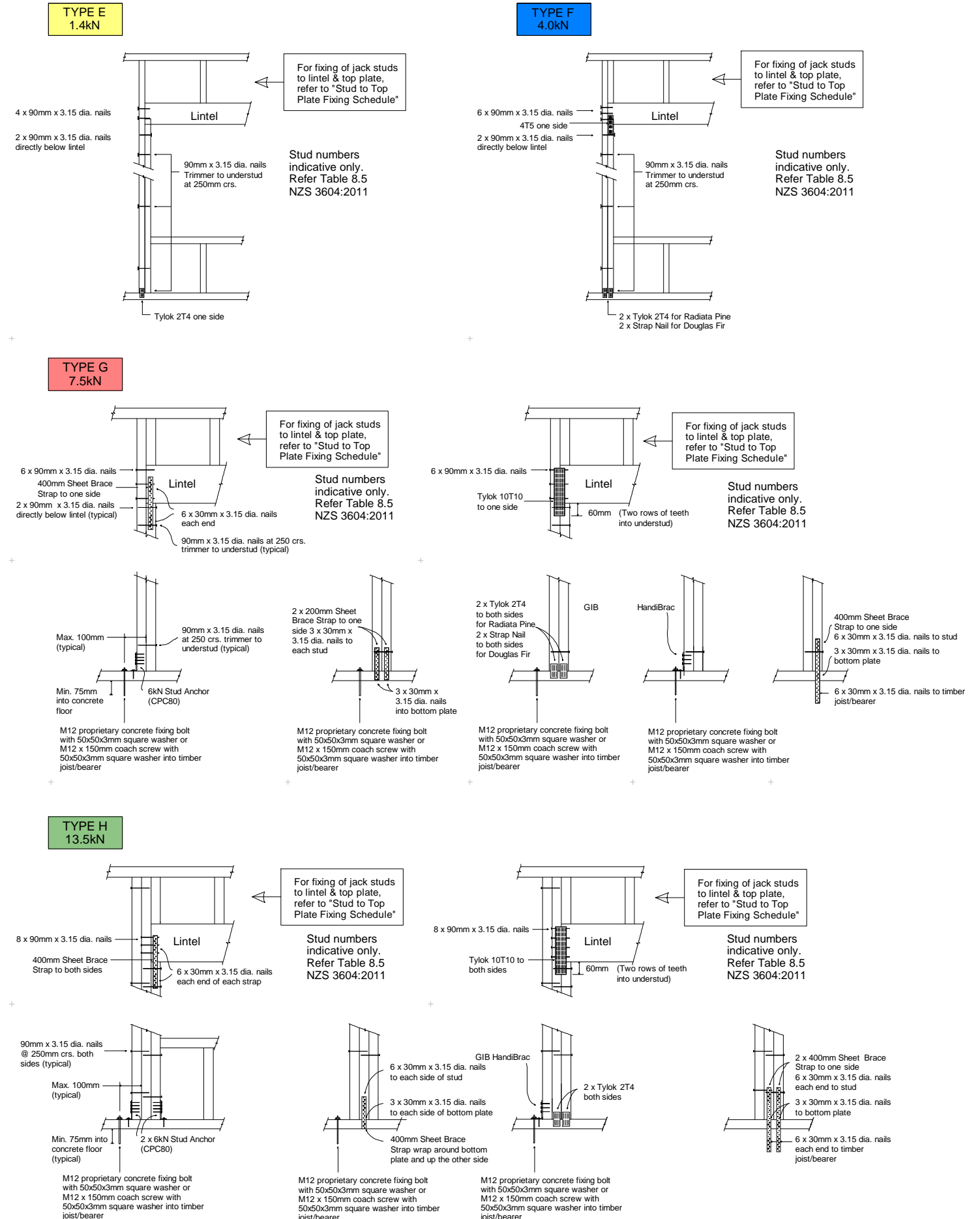
Roof Tributary Area	Light Roof Wind Zone				Heavy Roof Wind Zone			
	L	M	H	VH	L	M	H	VH
8.6 m²	G	G	H	H	G	G	H	H
11.6 m²	G	H	H	H	G	H	H	H
12.1 m²	G	H	H	H	G	H	H	H
15.3 m²	H	H	-	-	G	H	H	-
19.1 m²	H	-	-	-	H	-	-	-
20.9 m²	H	-	-	-	H	-	-	-
21.8 m²	H	-	-	-	H	-	-	-
34.3 m²	-	-	-	-	H	-	-	-

Notes:

- 1) Roof Tributary Area = approx. 1/2 x (Total roof area on girder and rafter trusses supported by lintel)
- 2) Assumed girder truss is at mid-span or middle third span of lintel
- 3) Use similar fixings for both ends of lintel
- 4) All other cases require specific engineering design.

SELECTION CHART FOR LINTEL FIXING

Lintel Span	Loaded Dimension (See Fig. 1.3 NZS 3604:2011)	Light Roof Wind Zone					Heavy Roof Wind Zone				
		L	M	H	VH	EH	L	M	H	VH	EH
0.7	2.0	E	E	E	E	F	E	E	E	E	F
	3.0	E	E	E	E	F	E	E	E	E	F
	4.0	E	E	E	E	F	E	E	E	E	F
	5.0	E	E	E	E	F	E	E	E	E	F
	6.0	E	E	E	E	F	E	E	E	E	F
0.9	2.0	E	E	E	E	F	E	E	E	E	F
	3.0	E	E	E	E	F	E	E	E	E	F
	4.0	E	E	E	E	F	E	E	E	E	F
	5.0	E	E	E	E	F	E	E	E	E	F
	6.0	E	E	E	E	F	E	E	E	E	F
1.0	2.0	E	E	E	E	F	E	E	E	E	F
	3.0	E	E	E	E	F	E	E	E	E	F
	4.0	E	E	E	E	F	E	E	E	E	F
	5.0	E	E	E	E	F	E	E	E	E	F
	6.0	E	E	E	E	F	E	E	E	E	F
1.2	2.0	E	E	E	E	F	E	E	E	E	F
	3.0	E	E	E	E	F	E	E	E	E	F
	4.0	E	E	E	E	F	E	E	E	E	F
	5.0	E	E	E	E	F	E	E	E	E	F
	6.0	E	E	E	E	F	E	E	E	E	F
1.5	2.0	E	E	E	E	F	E	E	E	E	F
	3.0	E	E	E	E	F	E	E	E	E	F
	4.0	E	E	E	E	F	E	E	E	E	F
	5.0	E	E	E	E	F	E	E	E	E	F
	6.0	E	E	E	E	F	E	E	E	E	F
2.0	2.0	E	E	E	E	F	E	E	E	E	F
	3.0	E	E	E	E	F	E	E	E	E	F
	4.0	E	E	E	E	F	E	E	E	E	F
	5.0	E	E	E	E	F	E	E	E	E	F
	6.0	E	E	E	E	F	E	E	E	E	F
2.4	2.0	E	E	E	E	F	E	E	E	E	F
	3.0	E	E	E	E	F	E	E	E	E	F
	4.0	E	E	E	E	F	E	E	E	E	F
	5.0	E	E	E	E	F	E	E	E	E	F
	6.0	E	E	E	E	F	E	E	E	E	F
3.0	2.0	E	E	E	E	F	E	E	E	E	F
	3.0	E	E	E	E	F	E	E	E	E	F
	4.0	E	E	E	E	F	E	E	E	E	F
	5.0	E	E	E	E	F	E	E	E	E	F
	6.0	E	E	E	E	F	E	E	E	E	F
3.6	2.0	E	E	E	E	F	E	E	E	E	F
	3.0	E	E	E	E	F	E	E	E	E	F
	4.0	E	E	E	E	F	E	E	E	E	F
	5.0	E	E	E	E	F	E	E	E	E	F
	6.0	E	E	E	E	F	E	E	E	E	F
4.2	2.0	E	E	E	E	F	E	E	E	E	F
	3.0	E	E	E	E	F	E	E	E	E	F
	4.0	E	E	E	E	F	E	E	E	E	F
	5.0	E	E	E	E	F	E	E	E	E	F
	6.0	E	E	E	E	F	E	E	E	E	F
4.5	2.0	E	E	E	E	F	E	E	E	E	F
	3.0	E	E	E	E	F	E	E	E	E	F
	3.4	E	E	E	E	F	E	E	E	E	F
	4.0	E	E	E	E	F	E	E	E	E	F
	5.0	E	E	E	E	F	E	E	E	E	F
4.8	2.0	E	E	E	E	F	E	E	E	E	F
	3.0	E	E	E	E	F	E	E	E	E	F
	3.2	E	E	E	E	F	E	E	E	E	F
	4.0	E	E	E	E	F	E	E	E	E	F
	5.0	E	E	E	E	F	E	E	E	E	F



PlaceMakers NEU

Job No: 17-00134433
Job Name: J & K Foote

Client: G.J. Gardner Homes
Building Consent No:

Site: 5 Catchpole Place, Woodend

DESIGN STATEMENT**MiTek Beam Program v1.10 June 2011****Certification of MiTek Beam Program v1.10 June 2011**

The MiTek Beam Program v1.10 June 2011 has been developed by MiTek New Zealand Ltd for the design of these beams: Timber, Glulam, GANGLAM and GANG-NAIL FLITCH BEAMS. The beam designs calculated by this program are prepared using sound and widely accepted engineering principles, and in accordance with Compliance Documents of the New Zealand Building Code and Verification Method B1/VM1 to satisfy the requirements of Clause B1 of the Building Code. We believe on reasonable grounds that these beams for the proposed building, if constructed in accordance with the drawings, specifications and other documents provided will comply with the relevant provisions of the NZ Building Code. This is subject to all proprietary products meeting their performance specification requirements; the provision of adequate bracing and fixings; and the correct input of design data carried out by suitably trained personnel. This document may be used by the Building Consent Authority to assist in determining compliance with the New Zealand Building Code.

Summary of MiTek Beam Program v1.10 June 2011 Data and Output**Roof**

Weight: light + ceiling
Dead Load: 0.45 kPa
Live Load: 0.25 kPa

Wind

Area/Speed: high (44.0 m/s)

Wall

Type: NA

Snow

Area: 0.9 kPa

Floor

Live Load: NA

Beam List

Opening Label	Beam Material	Beam Size	Beam Length	Design Status	Opening Label	Beam Material	Beam Size	Beam Length	Design Status
W1	MSG8/MSG8	2/140x45	1500	OKAY					
W2	MSG8/MSG8	2/140x45	1500	OKAY					
W3	MSG8/MSG8	2/140x45	1500	OKAY					
W4	MSG8/MSG8	2/140x45	1500	OKAY					
W5	MSG8/MSG8	2/90x45	900	OKAY					
W6	MSG8/MSG8	2/140x45	1500	OKAY					
W7	MSG8/MSG8	2/140x45	1500	OKAY					
W8	MSG8/MSG8	2/140x45	1200	OKAY					
W9	MSG8/MSG8	2/90x45	500	OKAY					
W10	MSG8/MSG8	2/190x45	1800	OKAY					
W11	MSG8/MSG8	2/190x45	2400	OKAY					
D1	MSG8/MSG8	2/240x45	2700	OKAY					
D2	MSG8/MSG8	2/190x45	1800	OKAY					
D3	MSG8/MSG8	2/90x45	900	OKAY					
D4	MSG8/MSG8	2/140x45	1400	OKAY					
D5	GN Flitch Beam	FB30M	4800	OKAY					
710X2	MSG8/MSG8	2/190x45	1450	OKAY					

GANGLAM plating details indicated with RD (regular duty plating), HD (heavy duty plating) and SHD (super heavy duty plating)

The design input has been carried out by:

Signed: 

Date: 12/09/2017

Name of Computer Operator: Isaac Arapai

Qualifications and Title: Detailer

Company: PlaceMakers NEU

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
171675 10/11/2017 nicolah

Date: Tuesday, 12 September 2017
 Job Number 17-00134433
 Job Name J & K Foote
 Client G.J. Gardner Homes
 Calculated By Isaac Arapai

Roof Weight light + ceiling
 Wind Zone high (44.0 m/s)
 Snow Load 0.9 kPa

Beam Details

Beam Label	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10
Beam Span (mm)	1500	1500	1500	1500	900	1500	1500	1200	500	1800
Roof Span "S" (mm)	2301	2502	2502	2268	2675	2675	7507	7507	7507	2425
Overhang (mm)	600	600	600	600	600	600	600	600	600	600
Wall Type										
Wall Height (mm)										
Floor Live load	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Floor Span "F" (mm)										

MiTek Bearing Reactions

Not in use in this version

Point Load 1										
Girder Span (mm)										
Setback (mm)										
Location (mm)										
Point Load 2										
Girder Span (mm)										
Setback (mm)										
Location (mm)										
Point Load 3										
Girder Span (mm)										
Setback (mm)										
Location (mm)										
Beam Status	OKAY	OKAY	OKAY	OKAY	OKAY	OKAY	OKAY	OKAY	OKAY	OKAY
Beam Material	MSG8/VSG8	MSG8/VSG8	MSG8/VSG8	MSG8/VSG8	MSG8/VSG8	MSG8/VSG8	MSG8/VSG8	MSG8/VSG8	MSG8/VSG8	MSG8/VSG8
Beam Size	2/140x45	2/140x45	2/140x45	2/140x45	2/90x45	2/140x45	2/140x45	2/140x45	2/90x45	2/190x45
Beam Deflection	0.75mm	0.8mm	0.8mm	0.75mm	0.41mm	0.83mm	1.87mm	0.77mm	0.09mm	0.65mm
Beam Length	1500	1500	1500	1500	900	1500	1500	1200	500	1800

Date: Tuesday, 12 September 2017
 Job Number 17-00134433
 Job Name J & K Foote
 Client G.J. Gardner Homes
 Calculated By Isaac Arapai

Roof Weight light + ceiling
 Wind Zone high (44.0 m/s)
 Snow Load 0.9 kPa

Beam Details

Beam Label	W11	D1	D2	D3	D4	D5	710X2			
Beam Span (mm)	2400	2700	1800	900	1400	4800	1450			
Roof Span "S" (mm)	3201	6844	1368	1525	3201	6603	6717			
Overhang (mm)	600	600	600	600	600	600				
Wall Type										
Wall Height (mm)										
Floor Live load	NA	NA	NA	NA	NA	NA	NA			
Floor Span "F" (mm)										

MiTek Bearing Reactions

Not in use in this version

Point Load 1										
Girder Span (mm)						6603	3201			
Setback (mm)						830	2301			
Location (mm)						1000	725			

Point Load 2										
Girder Span (mm)										
Setback (mm)										
Location (mm)										

Point Load 3										
Girder Span (mm)										
Setback (mm)										
Location (mm)										

Beam Status	OKAY	OKAY	OKAY	OKAY	OKAY	OKAY	OKAY			
Beam Material	MSG8/VSG8	MSG8/VSG8	MSG8/VSG8	MSG8/VSG8	MSG8/VSG8	GN Fitch Beam	MSG8/VSG8			
Beam Size	2/190x45	2/240x45	2/190x45	2/90x45	2/140x45	FB30M	2/190x45			
Beam Deflection	2.48mm	3.61mm	0.46mm	0.29mm	0.72mm	4.15mm	0.81mm			
Beam Length	2400	2700	1800	900	1400	4800	1450			

Placemakers National Estimating Unit (NEU)

Job: 17-34433

Client: G.J. Gardner Homes
Phone:Site: J & K Foote
5 Catchpole Place
Woodend
CanterburyDescription:
Building Consent No.:
MiTek 20/20 Engineering 4.7.91.0

Consent Issued BC171675

BC171675
Phone:

Printed: 12:38:57 12 Sep 2017

TRUSS BEARINGS EXCEEDING 8KN REPORT -
Ultimate Limit State LoadsMiTek® Truss List

Legend: ? = input only, ✕ = failed design, Ø = non certified, Unmarked trusses = designed successfully

Critical Trusses	Qty	Span (mm)	Joint	Bearing Reactions (kN)	
				Down	Uplift
GT01	1	6717	L	8.161	6.393
TG01	1	8182	N	8.662	6.901

Note:

1) Select appropriate Slab Thickening Detail from the MiTek 'Internal Load Bearing On Concrete Floor Slabs' brochure.



SN-R10080167

PROLAM SUMMARY

Customer/Project: Foote
Physical Address: 5 Catchpole Place, Woodend
Designer: Joe Jun, G.J.Gardner North
293 Cranford Street, St Albans, Christchurch 8052
E: joe.jun@gjgardner.co.nz P: 03 323 9154

Foote Garage Door Lintel

Prolam Lintels Supporting Roof and Ceiling

Building Type	House	Roof Weight	Light with Ceiling
Timber	Pine, Machined	Roof Load	0.40 kPa
Treatment	H1.2	Live Load	0.25 kPa uniform
Visual	No		1.10 kN concentrated
Exposed	No	Wind Zone	High (44.0 m/s)
Roof Pitch	25 °	Snow Region	No Snow
Eaves	600 mm		
Roof Span	6.51 m		
Lintel Span	4.86 m		

Use Prolam PL12H1-300100 290 x 90mm PL12

Capacity Ratio	1.8
Long Term Deflection	2.2 mm
Max. Bearing Reaction	10.0 kN
Load Combination	1.2G + W _{down}
Minimum Bearing Length	35 mm
Uplift Fixing Requirements	7.375 kN Characteristic Load

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
171675 10/11/2017 nicolah

PRODUCER STATEMENT



Tasman Consulting Engineers Limited has been engaged by Prowood to provide design services for the development of the Prolam Online calculator.

The design has been carried out using sound and widely accepted engineering principles to the requirements of AS/NZS1170:2002, NZS3603:1993 and NZS3604:2011 using the timber properties for GL8, GL12 and GL17 glulam and LVL15.

I believe on reasonable grounds that the above design will meet the requirements of clauses B1/VM1 of the Building Code Documents.

David King
David King

ME (civil, MIPENZ CPEng (no 145511) IntPE

For Tasman Consulting Engineers, PO Box 3631, Richmond, NELSON 7050

15 September 2017

283 Waiwhero Rd P O Box 413 Motueka New Zealand Phone 03 526 7436 Fax 03 526 7437

Email: info@prowoodnz.com • www.prolamnz.com

PROLAM[®] products are manufactured to the requirements of AS/NZS 1328.1:1998 Glue Laminated Structural Timber, and AS/NZS 1491:1996 Finger Jointed Structural Timber under an approved quality system based on the ISO 9000 series of standards. As such if the product is used in accordance with **PROLAM**[®] product literature, it will meet the durability clauses of the New Zealand Building Code B2.

Subfloor Applications:

- ☒ **PROLAM**[®] may be used where approved practices for clearance and ventilation are used.

External Use:

- ☒ **PROLAM**[®] is recommended for weather exposed applications if sealed and maintained in accordance with **PROLAM**[®] literature.

Preservative Treatment:

- ☒ **PROLAM**[®] Beams are CCA H3.2 treated as defined by NZS 3640:2003, for weather exposed applications, such as verandah beams, deck bearers, and subfloor applications.
- ☒ **PROLAM**[®] Posts are CCA H5 treated as defined by NZS 3640:2003 for in-ground and weather exposed applications, such as deck piles, verandah posts and similar applications.

Storage of **PROLAM**[®]:

- ☒ To ensure **PROLAM**[®] remains straight and true at the time of installation, follow the below recommendations:
 1. Store under cover so that it remains dry until installation.
 2. Stack clear of the ground for good ventilation.
 3. Stack on bearers to keep flat and straight.

Branded **PROLAM**[®]:

- ☒ **PROLAM**[®] is branded for your protection. Look-alike materials may not perform to the standard of **PROLAM**[®]. For your protection do not accept unauthorized substitution

Demand Calculation Sheet

Job Details

Name: Foote
 Street and Number: 5 Catchpole Place
 Lot and DP Number: Lot 20 DP 500690
 City/Town/District: Waimakariri
 Designer: Joe Jun
 Company: GJ Gardner Homes
 Date: Friday, 8 September 2017

Building Specification

Number of Storeys: 1
 Floor Loading: 2 kPa
 Foundation Type: Slab

Single
 Cladding Weight: Heavy
 Roof Weight: Light
 Room in Roof Space: No
 Roof Pitch (degrees): 25
 Roof Height above Eaves (m): 2.9
 Building Height to Apex (m): 5.3
 Ground to Lower Floor (m): 0.2

WAIMAKARIRI DISTRICT COUNCIL
 Plans and specifications APPROVED in accordance
 with the Building Act 2004, clause 49 and the Building
 Regulations 1992, Clause 3
 171675 10/11/2017 nicolah

Average Stud Height (m): 2.455
 Building Length (m): 16.87
 Building Width (m): 13.78
 Building Plan Area (m²): 179.44

Building Location

Wind Zone = High

Wind Region: A
 Lee Zone: No
 Ground Roughness: Open
 Site Exposure: Exposed
 Topography Class: T1

Earthquake Zone 2

Soil Type: D & E (Deep to Very Soft)
 Annual Prob. of Exceedance: 1 in 500 (NZS3604:2011 Default)

Bracing Units required for Wind

	Along	Across
Single Level	784	1048

Bracing Units required for Earthquake

	Along & Across
Single Level	1090

Single Level Along Resistance Sheet

Job Name: Foote

									Wind	EQ
									Demand	
									784	1090
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1482 189%	1516 139%
A	1	1.20	0	2.455	GS1-N	GIB®	81	70		
	2	1.20	0	2.455	GS1-N	GIB®	81	70		
	3	0.60	0	2.455	EP1 (0.6)	CHH	56	62		
	4	0.60	0	2.455	EP1 (0.6)	CHH	56	62		
External Length = 11									273 OK	264 OK
B	1	2.40	0	2.455	GS1-N	GIB®	162	141		
	2	3.00	0	2.455	GS2-NOM	GIB®	147	147		
	3	1.20	0	2.455	EP1 (1.2)	CHH	141	158		
External Length = 3.1									449 OK	446 OK
C	1	0.60	0	2.455	EP1 (0.6)	CHH	56	62		
	1	2.20	0	2.455	GS2-NOM	GIB®	108	108		
	2	5.30	0	2.455	GS2-NOM	GIB®	259	259		
External Length = 1.0									422 OK	428 OK
D	1	0.60	0	2.455	EP1 (0.6)	CHH	56	62		
	2	1.20	0	2.455	EP1 (1.2)	CHH	141	158		
	3	1.20	0	2.455	EP1 (1.2)	CHH	141	158		
External Length = 17									337 OK	378 OK

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Single Level Across Resistance Sheet

Job Name: Foote

									Wind	EQ
									Demand	
									1048	1090
									Achieved	
Line	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BUs)	EQ (BUs)	1270 121%	1280 117%
M	1	0.80	0	2.455	GS1-N	GIB®	48	46		
	2	0.80	0	2.455	GS1-N	GIB®	48	46		
	3	0.50	0	2.455	EP1 (0.4)	CHH	39	46		
	4	0.50	0	2.455	EP1 (0.4)	CHH	39	46		
External Length = 10.5									174 OK	185 OK
N	1	1.20	0	2.455	EP1 (1.2)	CHH	141	158		
	2	2.40	0	2.455	GS2-NOM	GIB®	117	117		
External Length = 1.6									258 OK	276 OK
O	1	3.40	0	2.455	GS1-N	GIB®	229	199		
									229 OK	199 OK
P	1	0.40	0	2.455	EP1 (0.4)	CHH	31	37		
	2	2.80	0	2.455	GS1-N	GIB®	189	164		
External Length = 3.6									220 OK	201 OK
Q	1	1.40	0	2.455	GS2-NOM	GIB®	68	68		
	2	1.40	0	2.455	GS2-NOM	GIB®	68	68		
									137 OK	137 OK
R	1	0.60	0	2.455	EP1 (0.6)	CHH	56	62		
	2	1.20	0	2.455	EP1 (1.2)	CHH	141	158		
	3	0.60	0	2.455	EP1 (0.6)	CHH	56	62		
External Length = 5.4									252 OK	282 OK

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Custom Wall Elements

Supplier	System	Min. Length m	Wind BUs/m	EQ BUs/m
CHH	EP1 (0.4)	.4	80	95
CHH	EP1 (0.6)	.6	95	105
CHH	EP1 (1.2)	1.2	120	135

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EzyBrace® Systems

Specification and installation manual

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CBI 5113

AUGUST 2016

NATIONAL SUPPORT

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GIB® HELPLINE

0800 100 442

Based on learnings derived from the 2011 Canterbury earthquakes GIB EzyBrace® Systems have been updated to offer improved design flexibility and further simplification of the bracing design and build process.

NEW GIB EZYBRACE® 2016 DESIGN SOFTWARE

- Improved user interface with simplified bracing design process.
- Increased functionality including exterior line check function, easy insert/deletion of bracing elements and built in software help function.
- Includes the new GIB® Bracing element GS2- NOM
- Allows the GIBFix® Framing System to be used in GIB EzyBrace® designs.

NEW GIB® BRACING ELEMENT GS2-NOM

- Allows internal walls lined with GIB® plasterboard on both sides and fastened off as per the standard fixing requirements of the current GIB® Site Guide to contribute to bracing resistance.
- Potentially reduces the amount of fasteners¹
- Encourages more even bracing distribution throughout the building.

¹ Actual savings dependent on building and bracing design

UPDATE TO OPENINGS IN BRACING ELEMENTS AND CEILING DIAPHRAGMS

- Large hole specification updated to use a more conservative methodology.
- Guidance included for fireplace flues and range hoods.

NEW — GIBFIX® FRAMING SYSTEM

- Reduced potential for fastener pop and joint cracking as a result of timber frame movement.
- Reduced potential for on-site call backs.
- Improved thermal performance.
- Reinforced plasterboard junctions.



BRANZ Appraised
Appraisal No .928 [2016]

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GIB EzyBrace® Systems — August 2016

Winstone Wallboards Ltd accepts no liability if GIB EzyBrace® Systems are not designed and installed in strict accordance with instructions contained in this publication.

USE ONLY THE CURRENT SPECIFICATION

This publication may be superseded by a new publication at any time. Winstone Wallboards accepts no liability for reliance upon publications that have been superseded. Check for the current publication at gib.co.nz/library before using this publication. If you are unsure whether this is the current publication, call the GIB® Helpline on 0800 100 442.

GIB EzyBrace® 2011 software and specification literature remains valid until further notice.

PATENTS

GIBFix® Framing System and GIB EzyBrace® Systems, including componentry and design method, have patents pending (NZ Patent Number 596691, NZ Patent 709159 pending) and design and other IP rights reserved.

Beware of substitution

The performance of GIB® Systems are very sensitive to design detailing and construction practices. All GIB® Systems have been developed specifically for New Zealand conditions and independently tested or assessed to ensure the required level of performance. It is important to use only GIB® branded components where specified and to closely follow the specified design details and construction practices, to be confident that the required level of performance and quality is achieved on site.

For further information call our GIB® Helpline on 0800 100 442.

GIB EzyBrace® Systems have been designed and tested using only the products specified. When additional GIB® plasterboard properties are required the table below provides acceptable alternative options.

	Acceptable alternative GIB® plasterboards								
Specified GIB® plasterboard	GIB® Standard	GIB Ultralite®	GIB Braceline/Noiseline®	GIB Aqualite®	GIB Toughline®	GIB Fyrelite®			
						10mm	13mm	16mm	19mm
GIB® Standard		OK	OK	OK	OK	Note 1 and 3			
GIB Braceline®	X	X		Note 2	OK	X	Notes 1, 2 and 3		

- Note 1** The fastener type and length must be as required for the relevant FRR system using the perimeter fixing pattern illustrated for the relevant bracing specification.
- Note 2** The element must be 900mm or longer. Decrease perimeter fastener centres to 100mm. The bracing corner fastening pattern, as illustrated for the relevant specification applies to all four corners of the element. Panel hold-down fixings are required.
- Note 3** Specify traditional wall framing layout (see figure 1) where a Fire Resistance Rating (FRR) is required.

Scope of use

This document is a guide to wall bracing of light timber frame (LTF) buildings constructed in accordance with NZS3604:2011 Timber Framed Buildings and presents a simple and efficient method for calculating and incorporating bracing resistance. This information draws on recent experiences from seismic activity in New Zealand and seeks to minimise earthquake damage to plasterboard linings in LTF buildings.

This document outlines the main principles of bracing design and construction using GIB® plasterboard products and systems. Further detailed information can be found in the GIB® Bracing Supplement by visiting gib.co.nz/library. This 'live' on-line document is updated continuously in response to market feedback and Winstone Wallboards' development initiatives.

Finish quality — framing and substrates

Home owners are increasingly demanding a high quality of interior finish. Finish quality is heavily influenced by the substrate to which linings are fixed. Detailed information on 'Levels of Finish' is given in AS/NZS 2589 and the latest version of the GIB® Site Guide.

New GIBFix® Framing System

With increased NZ Building Code requirements and growing customer demand for thermal efficiency and high quality interior finishes, traditional framing practices present problems such as multiple framing members at wall intersections creating thermal 'bridges' and cavities where insulation cannot be installed effectively.

Figure 1 shows a traditional wall framing layout. Figure 2 shows the alternative GIBFix® Framing System layout.

Multiple timber framing members also take longer to dry resulting in an increased risk of fastener pops and blemishes resulting from timber frame movement.

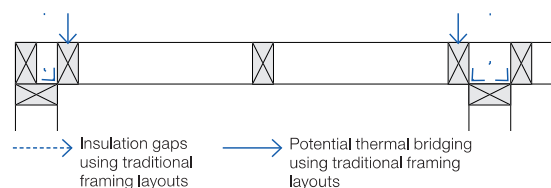
The GIBFix® Framing System offers better thermal efficiencies and minimises potential joint imperfections resulting from interior linings being fixed to multiple timber framing members.

The GIBFix® Framing System can be used in conjunction with GIB EzyBrace® Systems.

Bracing resistance is not affected by the GIBFix® Framing System if the use of this alternative timber framing layout is preferred. Refer to the GIBFix® Framing System literature for more information.

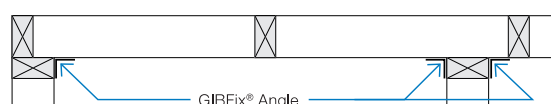
Bracing ratings apply whether fixing is directly into timber or into the metal components, provided correct construction details, fastener types and centres are applied.

FIGURE 1: TRADITIONAL WALL FRAMING LAYOUT



GFS004

FIGURE 2: GIBFix® FRAMING SYSTEM (ALTERNATIVE LAYOUT)



GFS005

NEW GS2-NOM Bracing Element

The new GS2-NOM bracing element allows most homes to be braced with a single lining type and less fixings so that a high quality finish is maintained throughout.

GS2-NOM permits the contribution of 'nominally fixed' internal walls. Higher performance elements are commonly specified on external walls and where limited wall area is available or adjacent to significant openings.

Winstone Wallboards recommends the use of the GIBFix® Framing System in conjunction with GS2-NOM elements. Key benefits of this approach include:

- Reduced potential for fastener pop and joint cracking of plasterboard linings.
- Enhanced thermal performance.
- Allows internal walls lined with GIB® plasterboard on both sides and fastened off as per the standard fixing requirements of the current GIB® Site Guide to contribute bracing resistance.
- Potentially reduces the amount of fasteners!
- Encourages more even bracing distribution throughout the building.

1. Actual savings dependent on building and bracing design.

Compliance with the NZ Building Code

NZBC CLAUSE B1 — STRUCTURE

The design and material specification for steel and timber framing used in conjunction with this literature must be in accordance with the performance requirements of NZBC Clause B1. GIB EzyBrace® Systems comply with the requirements of NZS 3604:2011, when designed and installed in accordance with this publication and relevant technical literature. NZS 3604:2011 is an acceptable solution to NZBC Clause B1.

NZBC CLAUSE B2 — DURABILITY

Under normal conditions of dry internal use GIB EzyBrace® Systems have a service life in excess of 50 years and satisfy the requirements of NZBC Clause B2. When in conditions of dry internal use, the components specified in this literature satisfy the requirements of NZBC Clause B2.

GIB® EzyBrace® Systems must not be specified in areas where 15 year durability applies and where linings are subject to direct water pressure, e.g. shower cubicle or shower over bath situations.

NZBC CLAUSE F2 — HAZARDOUS BUILDING MATERIALS

Under normal conditions of use, during handling, installation or serviceable life, the products detailed in GIB EzyBrace® Systems do not constitute a health hazard and meet the provisions of the NZBC Clause F2.

NZBC CLAUSE H1 — ENERGY EFFICIENCY

Buildings must be constructed to achieve an adequate degree of energy efficiency and the building envelope must provide adequate thermal resistance. The required thermal resistance (R-value) of timber framed external walls depends on climate zone but is commonly in the range from R 1.9 to R 2.0.

CAD design details

Where applicable drawings related to GIB EzyBrace® Systems have been produced for CAD design. These are identified by a unique number in the bottom corner of each detail box. CAD design details can be found at gib.co.nz/library.

Appraisal

GIB EzyBrace® Systems 2016 have been appraised by the Building Research Association of New Zealand (BRANZ), Appraisal No. 928 (2016) GIB EzyBrace® Systems, 2016.

It is of prime importance to comply with the details of design, construction and workmanship in this document.

Bracing demand

GIB EZYBRACE® CALCULATOR

The GIB EzyBrace® calculator is a software tool to determine the wind and earthquake bracing demand and to design the bracing resistance for light timber-framed buildings constructed in accordance with NZS 3604:2011.

The updated GIB EzyBrace® calculator combines an up-to-date user-friendly interface with the latest knowledge relating to the performance of GIB® plasterboard in light timber-framed structures when subjected to high winds or earthquakes. The calculator can be down-loaded free of charge by visiting gib.co.nz/ezybrace and can be installed on either Microsoft® or Apple® Mac environments.

DEMAND

Wind and Earthquake 'Demand' calculates the forces a structure must be able to resist during its 'design life'. The GIB EzyBrace® calculator's Demand sheet determines the number of Bracing Units required depending on building location, building dimensions and materials used. The Demand sheet closely follows the familiar format of our Excel based GIB EzyBrace® calculator, and includes additional features such as a pop-up help facility explaining required input.

Bracing resistance sheets ('tabs') are added depending on the building specification entered. For example, subfloor bracing resistance tabs only show when a 'subfloor' foundation type has been selected.

The Demand sheet gives the designer the option to select a longer earthquake return period which represents a higher earthquake design force. The default for buildings constructed in accordance with NZS3604:2011 is an earthquake that has a 10% chance of being exceeded within the assumed 50 year 'design life' of a light timber framed residential structure, a 'return period' of 500 years.

Many commercial and public buildings are designed for the more stringent requirement of a 10% probability of exceedance in a 100 or 250 year life expectancy.

A screen shot of the GIB EzyBrace® 2016 Demand Sheet and Help Facility is shown in figure 5.

FIGURE 5: GIB EZYBRACE® 2016 — DEMAND CALCULATION SHEET AND 'POP UP' HELP FACILITY

GIB EzyBrace® Bracing Software

Job Details

Name: A Job
 Street and Number: 100 Job Street
 Lot and DP Number: Lot 321, DP 456
 City/Town/District: Johnson
 Designer: JAR Object
 Company: Jide Limited
 Date: 1/08/15

Building Specification

Number of Storeys: Single
 Floor Loading: 2 kPa
 Foundation Type: Slab

Single

Cladding Weight: 9 Light
 Roof Weight: 9 Light
 Room in Roof Space: No
 Roof Pitch: 9 25
 Roof Height above Eaves (m): 1.5
 Building Height to Apex (m): 4.5
 Ground to Lower Floor (m): 0.2
 Stud Height (m): 2.4
 Building Length (m): 10
 Building Width (m): 10
 Building Area (m²): 100

Building Location

Wind Zone = Low
 Wind Zone or Consent Authority: Not Available
 Wind Region: 9 A
 Lee Zone: No
 Ground Roughness: 9 Urban
 Site Exposure: 9 Sheltered
 Topography Class: 9 11

Earthquake Zone: 9
 Soil Type: D & E (Deep to Very Soft)
 Annual Prob. of Exceedance: 1 in 500 (NZS3604:2011 Default)

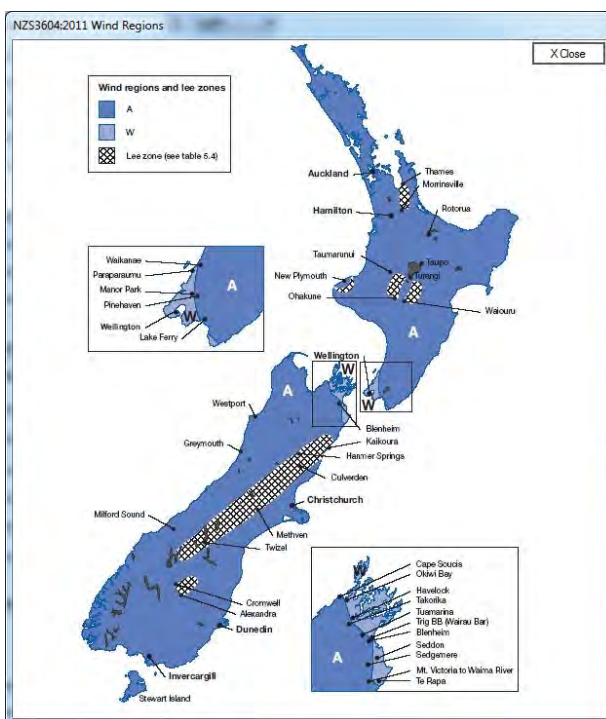
Bracing Units required for Wind

	Along	Across
Single Level	258	222

Bracing Units required for Earthquake

	Along and Across
Single	264

Demand | Single Along | Single Across | Custom



Download GIB EzyBrace® 2016 design software from gib.co.nz/ezybrace

Software functionality

Innovations adopted in the GIB EzyBrace® 2016 bracing 'resistance' calculation sheets include the ability to easily add and delete lines and elements during calculations.

The software compares bracing resistance achieved with demand and for wall bracing lines incorporating external walls, the external wall length can now be entered to check minimum

bracing units required on that line. The NZS 3604:2011 rules and associated software output are not the only check. Designers must additionally check the building layout to ensure adequate bracing distribution.

Figures 6 and 7 show screen shots of the Wall and Subfloor Resistance Sheets respectively.

FIGURE 6: GIB EZYBRACE® 2016 — WALL BRACING RESISTANCE CALCULATION SHEET

Line	Ext. Len. (m)	Element	Length (m)	Angle (degrees)	Stud Ht. (m)	Type	Supplier	Wind (BU)	Earthquake (BU)
a	11.25	1	0.5		2.44	GSP-H	GIB®	53	58
		2	1.1		2.44	GS1-N	GIB®	72	65
		3	0.6		2.44	GSP-H	GIB®	67	73
b	6.41	1	1.2		2.44	GS1-N	GIB®	81	71
		2	0.6		2.44	GS1-N	GIB®	34	35
		3	4		2.44	GS2-NOM	GIB®	197	197
c		1	3.2		2.44	GS2-NOM	GIB®	157	157
d		1	7.9		2.44	GS2-NOM	GIB®	389	389
e	17.9	1	0.6		2.44	BL1-H	GIB®	58	60
		2	0.6		2.44	BL1-H	GIB®	58	60
		3	0.8		2.44	GS1-N	GIB®	48	46
		4	2.1		2.44	GS1-N	GIB®	143	124
		5	1.2		2.44	EP1-12	CH1	142	159

Wind Demand	Earthquake Demand	Wind Resistance	Earthquake Resistance
682	890	1499	1492
220%	170%		
193 OK	196 OK		
312 OK	302 OK		
157 OK	157 OK		
389 OK	389 OK		
449 OK	449 OK		

FIGURE 7: GIB EZYBRACE® 2016 — SUBFLOOR BRACING RESISTANCE CALCULATION SHEET

Download GIB EzyBrace® 2016 design software from gib.co.nz/ezybrace

Line	Ext. Len. (m)	Element	Length (m) or No.	Angle (degrees)	Type	Supplier	Wind (BU)	Earthquake (BU)
A		1	1		Braced Piles	NZS3604	160	120
		2	1		Anchor Pile	NZS3604	160	120
		3	1		Braced Piles	NZS3604	160	120
B		1	1		Braced Piles	NZS3604	160	120
		2	1		Cantilever Pile	NZS3604	70	30
		3	1		Cantilever Pile	NZS3604	70	30
C		1	1		Anchor Pile	NZS3604	160	120
		2	1		Anchor Pile	NZS3604	160	120

Wind Demand	Earthquake Demand	Wind Resistance	Earthquake Resistance
426	687	1100	780
258%	114%		
480 OK	360 OK		
300 OK	180 OK		
320 OK	240 OK		

Software functionality

Custom elements can be entered by accessing the 'custom' tab as shown in figure 8.

FIGURE 8: GIB EZYBRACE® 2016 — CUSTOM ELEMENTS SHEET

Supplier	System	Min. Length (m)	Wind (Pa/m)	EQ (kN/m)	Element Height (Dependant)	Element Foundation (Dependant)
Custom1	CU1 0.4	0.4	80	95	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Custom1	CU1 0.6	0.6	95	105	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Custom1	CU1 1.2	1.2	120	135	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Custom2	CU2 0.4	0.4	90	98	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Custom2	CU2 0.6	0.6	127	136	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Custom2	CU2 1.2	1.2	164	133	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Engineer	Portal	1	300	300	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Note: Values and systems shown in Custom Elements Sheets are for illustrative purposes only.

Help can be accessed by pressing the ? symbol which displays a window with further information.

The GIB EzyBrace® 2016 software has a number of options that can be accessed via the File tab at the top left hand corner of the window. The options include: New, Save, Save As, Open, Recent and Print.

- The New option closes any opened job ready for the input of a new job.
- The Save option saves the currently opened job to the same filename and the Save As option saves the job to a new filename.

- The Open option prompts for the name of an existing job.
- The Recent option displays a list of the ten latest jobs and allows for the selection of one of these jobs to be opened.
- The Print option displays the print screen. In this screen, a print preview is displayed. The print preview can be copied to the clipboard by clicking the right-hand mouse button. Also on the print screen is the option to choose which pages are to be printed and the option to print the output to a portable data format, PDF, file.
- The Print Screen View is shown in figure 9.

FIGURE 9: GIB EZYBRACE® 2016 — PRINT SCREEN VIEW

Download GIB EzyBrace® 2016 design software from gib.co.nz/ezybrace

Demand Calculation Sheet	
General Name and Address: [Blank] Lot and Off Number: [Blank] City/Town/District: [Blank] Country: [Blank] Date: [Blank]	
Building Information Number of Storeys: 1 Floor Loading: 2 kPa Foundation Type: [Blank]	
Bracing Information Bracing System: Single Height of Bracing: 1.5m Height of Windward Wall: 1.5m Area of Windward Wall: 30 Area of Leeward Wall: 30 Building Height to Apex (m): 2.5 Building Height to Eave (m): 2.5 Ground to Lowest Floor (m): 0.0	
Bracing Location Wind Direction: [Blank] Earthquake Zone: 1 Return Period: 100 years Ground Prox. of Earthquake: 1 to 500 metres (1000m Default)	
Bracing Limits required for Wind	
Along	Across
Single Level: 143	Single Level: 177

GIB® plasterboard linings

When fixing part sheets of GIB® plasterboard, a minimum sheet width of 300mm applies for bracing elements. Horizontal fixing is recommended. If fixing vertically, full height sheets shall be used where possible. Where sheet end butt joints are unavoidable they must be formed over nogs or over the studs and fastened at 200mm centres. Alternatively, and preferably, sheet end butt joints may be back-blocked.

When a GIB® Bracing element has been designated for a section of wall, BU ratings cannot be increased by incorporating additional proprietary bracing elements within that same section of wall.

LIMITATIONS

- GIB® plasterboard must be stacked flat and protected from the weather.
- GIB® plasterboard must be handled as a finishing material.
- GIB® plasterboard in use must not be exposed to liquid water or be installed in situations where extended exposure to humidities above 90% RH can reasonably be expected.
- GIB EzyBrace® Systems must not be used in showers or behind baths.
- It is highly recommended not to install GIB® plasterboard in any situation where external claddings are not in place or the property is not adequately protected from the elements.
- If GIB® plasterboard is installed under these conditions, the risk of surface defects such as joint peaking or cracking is greatly increased.

GIB EzyBrace® Systems in water-splash areas

When GIB® plasterboard is installed in locations likely to be frequently exposed to liquid water it must have an impervious finish. Examples are adhesive fixed acrylic shower linings or ceramic tiles over an approved waterproof membrane over GIB Aqualine®. The NZBC requires 15 years durability in these situations. Bracing elements are required to have a durability of 50 years. Bracing elements are not to be located in shower cubicles or behind baths because of durability requirements, the likelihood of renovation, and practical issues associated with fixing bracing elements to perimeter framing members. Otherwise GIB EzyBrace® Systems can be used in water-splash areas as defined by NZBC Clause E3, provided these are maintained impervious for the life of the building.

For further design details refer to the current GIB Aqualine® Wet Area Systems literature.

Renovation

When relining walls during the process of renovation, ensure that bracing elements are reinstated (check the building plans).

Openings in bracing elements

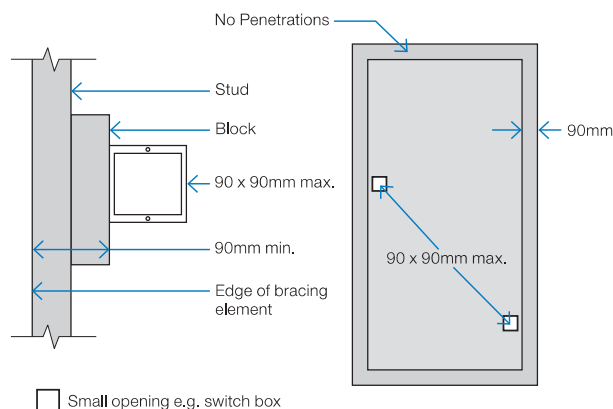
SMALL OPENINGS

Small openings (e.g. power outlets) of 90 x 90mm or less may be placed no closer than 90mm to the edge of the braced element. A block may need to be provided alongside the perimeter stud as shown below.

LARGE OPENINGS

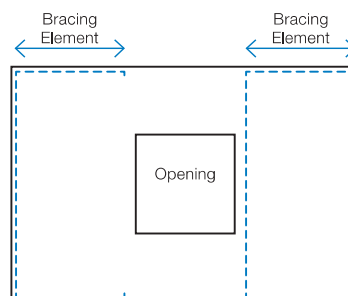
Openings above 90 x 90mm such as switch boards, recessed cabinets and TV's etc. should be placed outside of the bracing element or locate bracing on the other side of the wall framing.

FIGURE 10: SMALL OPENINGS IN BRACING ELEMENTS



GEB001

FIGURE 11: LARGE OPENINGS AND BRACING ELEMENTS



Timber framing

General framing requirements such as grade, spacings and installation shall comply with the provisions of NZS 3604:2011. To achieve the published bracing performance the minimum actual framing dimensions are 90 x 45mm for external walls and 70 x 45mm for internal walls.

As a minimum the use of Kiln Dried Stress Graded timber for all wall, roof and mid-floor framing members is recommended.

GIBFix® Framing System (alternative layout)

Practices recommended as part of the GIBFix® Framing System aim to increase timber framing efficiencies, reduce reliance on unnecessary framing at wall junctions and minimise surface imperfections that commonly arise from constructing plasterboard junctions over multiple timber members. GIBFix® Angles fixed to a single timber framing member are introduced to tie together plasterboard junctions, improving seismic resilience and decrease the risk of future defects due to timber movement. The GIBFix® Framing System can be used in conjunction with the GIB EzyBrace® System.

Note: GIBFix® Angles and 32mm x 7g GIB® Grabber® Dual Thread Screws may also be used in traditional wall framing layouts and in GIB EzyBrace® Systems.

When the GIBFix® Framing System is used a minimum of 2 equally spaced nogs for walls between 2.4m and 3m in height are required at corners and wall junctions.

When used in GIB EzyBrace® systems GIBFix® Angles must run from top to bottom on all applicable studs. If 2 GIBFix® Angles are required on a stud they must be overlapped by a minimum of 300mm with 2/32mm 7g GIB® Grabber® Dual Thread Screws penetrating through both GIBFix® Angles.

For full specification details refer to GIBFix® Framing System literature available at gib.co.nz/gibfix.

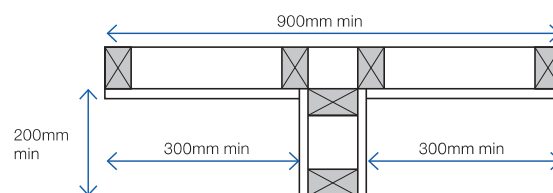
Guidelines for intersection walls

GIB® Bracing Elements may have intersecting walls with a minimum length of 200mm. Fasteners are required around the perimeter of the bracing element. Vertical joints at T-junctions shall be fixed and jointed as specified for intermediate sheet joints. The bracing element length must be no less than 900mm.

Where a Wall Bracing Element is interrupted by a T-junction the element is deemed to be continuous for the whole length (900mm minimum in the example illustrated).

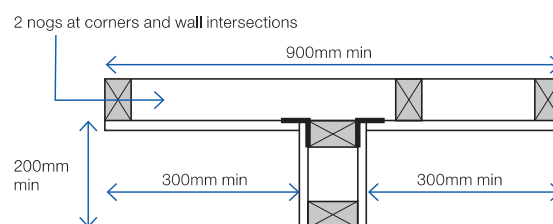
When fixing part sheets of GIB® plasterboard to the side of a T-junction, a minimum width of 300mm applies for bracing elements. See figures 12 and 13.

FIGURE 12: WALL INTERSECTION (TRADITIONAL WALL FRAMING)



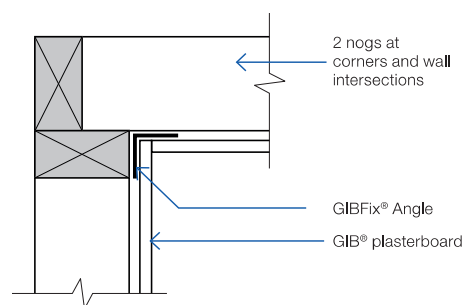
GEB002

FIGURE 13: WALL INTERSECTION (GIBFix® FRAMING SYSTEM)



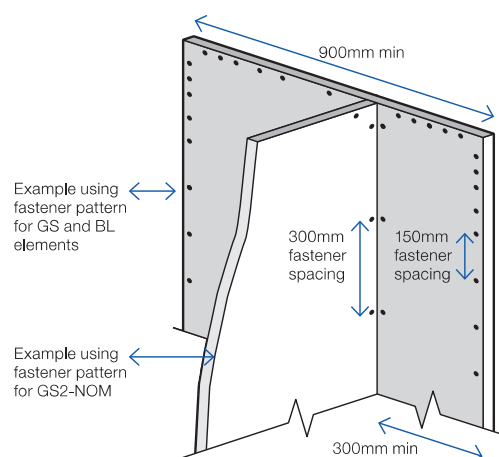
GEB003

FIGURE 14: CORNER INTERSECTION (GIBFix® FRAMING SYSTEM)



GFS001

FIGURE 15: WALL INTERSECTION FASTENER PLACEMENT



Junction

Min 32mm x 6g GIB® Grabber® High Thread or 32mm x 7g GIB® Grabber® Dual Thread Screws @ 300mm ctrs each side.

Top plate connections

For top plate connections refer to NZS3604:2011 section 8.7.3.

Parapets and gable end walls

Bracing elements must be fixed from top plate to bottom plate. Fixing to a row of nogs is not acceptable unless either:

A continuous member such as an ex 90 x 45mm ribbon plate is fixed across the studs just above a row of nogs at the ceiling line, as shown in figure 16.

or

GIBFix® Angle as shown in figure 17. The angle is fixed to a row of nogs with 30 x 2.5mm galv flat head nails or 32mm x 7g GIB® Grabber® Dual Thread Screws at 300mm centres.

Bottom plate fixing

TIMBER FLOOR

For elements with an 'N' specification use 2/100 x 3.75mm hand or 3/90 x 3.15mm power-driven nails at 600mm centres.

In addition, for elements with an 'H' specification, use GIB HandiBrac® panel hold-down fixings at each end of the bracing element, see p.16.

CONCRETE FLOOR – EXTERNAL WALL BRACING ELEMENTS

For bracing elements with an 'N' specification fix external wall plates in accordance with NZS 3604:2011.

Use GIB HandiBrac® panel hold-down fixings at each end of bracing elements with an 'H' specification and minimum intermediate fixings as required by NZS 3604:2011.

CONCRETE FLOOR – INTERNAL WALL BRACING ELEMENTS

For bracing elements with an 'N' specification fix plates in accordance with NZS 3604:2011 or use 75 x 3.8mm shot-fired fasteners with 16mm discs spaced at 150 and 300mm from end-studs and 600mm centres thereafter.

For bracing elements with an 'H' specification use GIB HandiBrac® panel hold-down fixings at each end of the element and minimum intermediate fixings as required by NZS 3604:2011.

FIGURE 16: PARAPETS AND GABLE ENDS WITH RIBBON PLATE

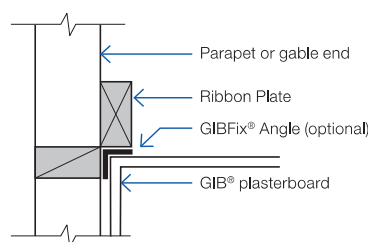
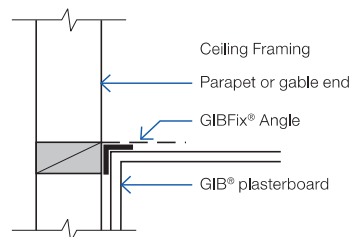


FIGURE 17: PARAPETS AND GABLE ENDS WITH GIBFIX® ANGLE



GFS003

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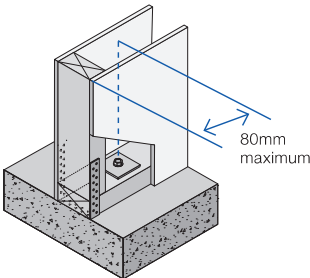
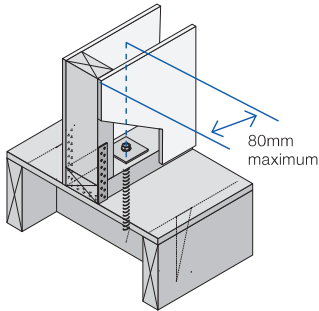
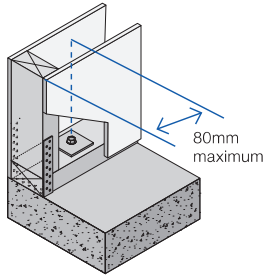
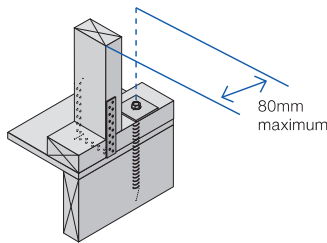
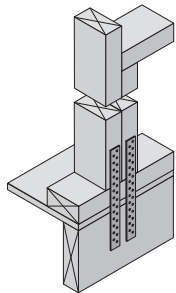
BOTTOM PLATE FIXINGS FOR GIB® BRACING ELEMENTS

Brace type	Concrete slabs		Timber floors
	External wall	Internal wall	External and Internal walls
GS1-N	As per NZS 3604:2011. No specific additional fastening required.	As per NZS 3604:2011. Alternatively use 75 x 3.8mm shot-fired fasteners with 16mm discs, 150mm and 300mm from each end of the bracing element and at 600mm thereafter.	Pairs of 100 x 3.75mm flat head hand driven nails or 3/90 x 3.15mm power driven nails at 600mm centres in accordance with NZS 3604:2011.
GS2-N	Not applicable.		
GS2-NOM			
GSP-H BL1-H BLP-H	Intermediate fastenings to comply with NZS 3604:2011 In addition: GIB HandiBrac® fixings or metal wrap-around strap fixings and bolt as illustrated on p.15 and 16.		Pairs of 100 x 3.75mm flat head hand driven nails or 3/90 x 3.15mm power driven nails at 600mm centres in accordance with NZS 3604:2011. In addition: GIB HandiBrac® fixings or metal wrap-around strap fixings and bolt as illustrated on p.15 and 16.
BLG-H	Not applicable	As for GSP-H, BL1-H, BLP-H on concrete slab as illustrated on p.15 and 16.	

Bracing strap installation

Care needs to be taken with the installation of the bracing strap. It should be checked in to be flush with the face of the stud providing a flat substrate for the plasterboard and

positioned in such a way that the corner fastenings of the bracing element are not affected by it. Keeping the strap to the edge of the end stud as shown will allow the corner fastenings to be installed without having to penetrate the bracing strap.

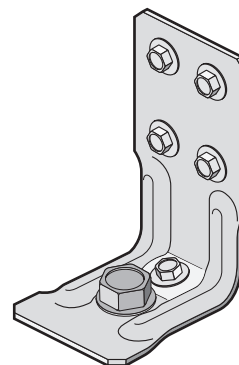
Concrete floor	Timber floor
<p>400 x 25 x 0.9mm galvanised strap to pass under the plate and up the other side of the stud. Six 30 x 2.5mm flat head galvanised nails to each side of the stud. Three 30 x 2.5mm flat head galvanised nails to each side of the plate. Hold down bolt with 50 x 50 x 3mm washer to be fitted within 80mm of the end of the element.</p>	
Internal wall	
 <p>GEB004</p>	 <p>GEB005</p>
External wall	
 <p>GEB006</p>	 <p>GEB007</p>
<p>Note: Where applicable drawings have been produced for CAD design. These are identified by a unique number in the bottom corner of each detail box that can be found at gib.co.nz/library.</p>	
<p>2/300 x 25 x 0.9mm galvanised straps with six 30 x 2.5mm flat head galvanised nails to each stud and into the floor joist and three nails to the plate. Block to nog fixed with 3/100 x 3.75mm nails to stud.</p>	
 <p>GEB008</p>	
Hold-down fastener requirements	
Concrete floor	Timber floor
A mechanical fastening with a minimum characteristic uplift capacity of 15kN fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element.	12 x 150mm galvanised coach screw fitted with a 50 x 50 x 3mm square washer within 80mm of the ends of the bracing element

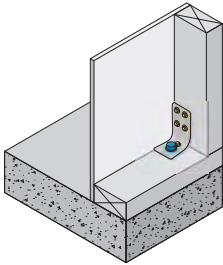
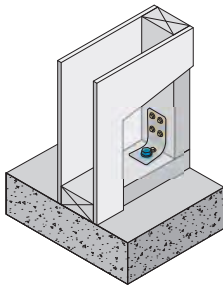
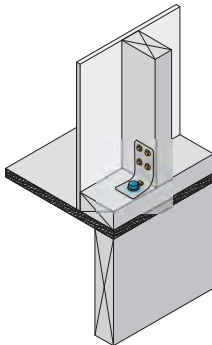
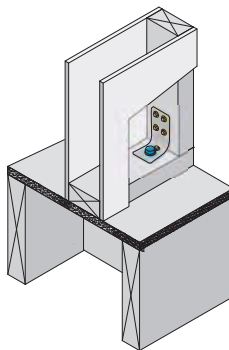
GIB HandiBrac® installation

Developed in conjunction with MiTek™, the GIB HandiBrac® has been designed and tested by Winstone Wallboards for use in GIB EzyBrace® elements that require hold-downs. The GIB HandiBrac® is a substitute for bottom plate hold-down straps.

- Quick and easy to fit.
- May be fitted at any stage before lining.
- Framing face is clear to allow flush lining.
- Easily inspected.

The GIB HandiBrac® with BOWMAC® blue head screw bolt is suitable for timber and concrete floors constructed in accordance with NZS 3604:2011.



Concrete floor		Timber floor	
External walls	Internal walls	External walls	Internal walls
 <p>GEB009</p> <p>Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate.</p>	 <p>GEB010</p> <p>Position GIB HandiBrac® at the stud/plate junction and at mid-width of plate.</p>	 <p>GEB011</p> <p>Position GIB HandiBrac® flush with the outside stud face, as close as practicable to the centre of the boundary joist.</p>	 <p>GEB012</p> <p>Position GIB HandiBrac® in the centre of floor joist or full depth solid block.</p>
Hold-down fastener requirements			
A mechanical fastening with a minimum characteristic uplift capacity of 15kN or use supplied BT10/140 screwbolt in GIB HandiBrac® pack.		12 x 150mm galvanised coach screw or use supplied BT10/140 screwbolt in GIB HandiBrac® pack.	

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GIB HandiBrac[®] placement with GIBFix[®] Framing System for concrete floors

Figure 18 shows the preferred positioning of the GIB HandiBrac[®] panel hold-down brackets within the GIBFix[®] Framing System layout and where they are required by bracing systems with an 'H' in the specification code.

Note that, in corners and at wall junctions, a single GIB HandiBrac[®] can serve 'H' type bracing elements in both directions, but additional intermediate concrete anchors may need to be installed to meet the minimum requirements of NZS 3604:2011 for bottom plate fixing.

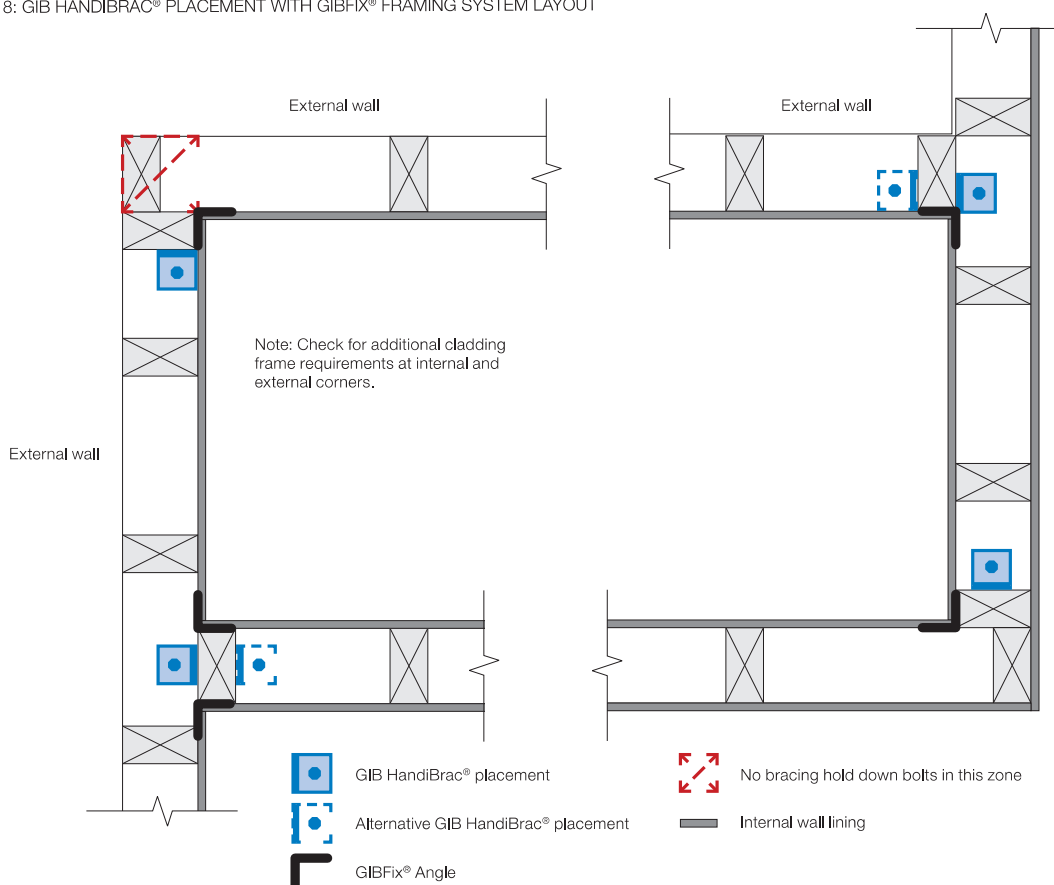
The GIB HandiBrac[®] is fixed to the stud which has the GIBFix[®] Angle.

For bracing elements with sheet material both sides of the wall connect corner studs using 8/90mm gun nails as shown in figure 19.

TIMBER FLOORS

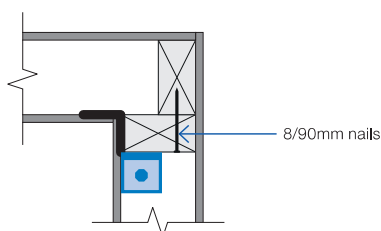
For timber floors bolt fixing in to solid joist or block is required, as shown on p 15.

FIGURE 18: GIB HANDIBRAC[®] PLACEMENT WITH GIBFIX[®] FRAMING SYSTEM LAYOUT



GEB013

FIGURE 19: STUD CONNECTION FOR 'H' TYPE BRACING ELEMENTS WITH SHEET MATERIAL BOTH SIDES



GEB014

Ceiling diaphragms

GIB® plasterboard ceiling diaphragms are stiff and strong horizontal elements which effectively transfer loads to bracing walls. They themselves do not have a bracing unit rating but are used when bracing lines exceed 6m separation. The basic shape of a ceiling diaphragm is square or rectangular. Protrusions are permitted but cut-outs are not. The length of a ceiling diaphragm shall not exceed twice its width. Dimensions are measured between supporting bracing lines. Supporting bracing lines shall have a bracing capacity no less than the greater of 100 bracing units or 15 bracing units per metre of diaphragm dimension, measured at right angles to the line being considered, see figure 21.

Limitations for GIB® plasterboard ceiling diaphragms

Ceiling diaphragms may be constructed using any GIB® plasterboard provided perimeter fixing is at;

150mm centres for: Diaphragms up to 7.5m in length, no steeper than 15°.

100mm centres for: Diaphragms up to 7.5m in length, no steeper than 45°. Diaphragms up to 12m in length, no steeper than 25°.

Diaphragms outside these parameters must be specifically designed.

General fixing requirements for GIB® Ceiling Diaphragms:

- Linings must be installed over the entire area of the diaphragm.
- Fastening must be no less than 12mm from sheet edges and not less than 18mm from sheet ends.
- Sheets must be supported by framing members (e.g., ceiling battens) spaced at no more than 500mm centres for 10mm GIB® plasterboard and at no more than 600mm centres for 13mm GIB® plasterboard.
- Sheets within the diaphragm area may be fastened and finished conventionally in accordance with the publication entitled, "GIB® Site Guide". All joints shall be GIB® Joint Tape reinforced and stopped. It is recommended that sheet butt joints are formed off framing and back-blocked (see "GIB® Site Guide").
- Use full width sheets where possible. At least 900mm wide sheets with a length not less than 1800mm shall be used. Sheets less than 900mm wide but no less than 600mm may be used provided all joints with adjacent sheets are back-blocked (see "GIB® Site Guide" and figure 22).
- Fasteners are placed at the specified centres around the ceiling diaphragm with the corners fastened using the GIB EzyBrace® fastener pattern.

FIGURE 20: PROTRUSIONS AND CUTOUTS

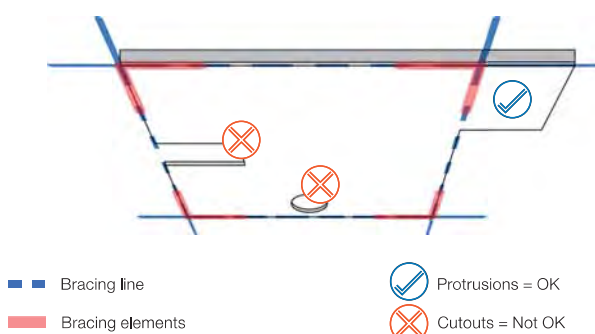


FIGURE 21: DIAPHRAGM BRACING LINING SPACINGS

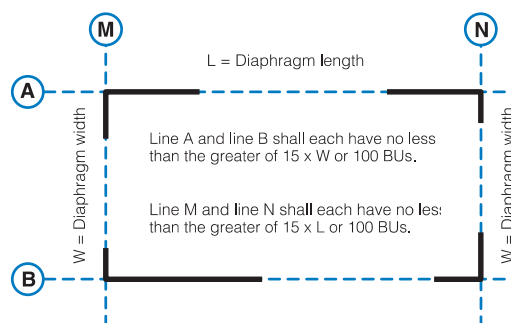


FIGURE 22: GIB® CEILING DIAPHRAGM SHEET WIDTHS AND LENGTHS

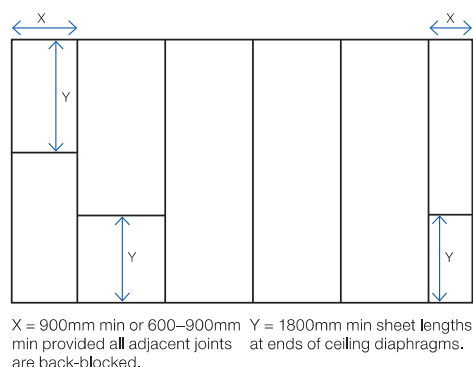
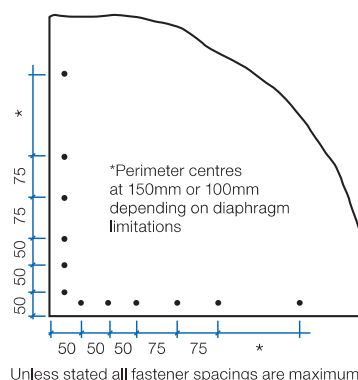


FIGURE 23: GIB EZYBRACE® FASTENER PATTERN



GEB015

Ceiling battens in ceiling diaphragms

Ceiling diaphragms may be constructed using steel or timber ceiling battens.

Battens shall be spaced at a maximum of:

- 500mm for 10mm GIB® plasterboard.
- 600mm for 13mm GIB® plasterboard.

Timber battens shall be fixed in accordance with the requirements of NZS 3604:2011.

Metal battens shall be GIB® Rondo® battens with two external flanges of 8mm to allow direct screw fixing to roof framing.

GIB® Rondo® metal battens shall be fixed with 2/32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws to supporting framing.

GIB® Rondo® metal battens must be fixed directly to the roof framing. If a clip system has been used, a timber block (min 300mm) or a continuous timber member can be fixed alongside the bottom chord to permit a direct connection to the batten, see figure 26.

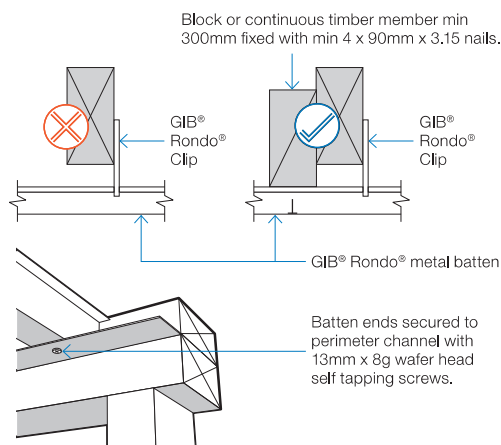
For GIB® Rondo® metal battens, a GIB® Rondo® metal channel or metal angle is required at the perimeter of the diaphragm. The perimeter channel shall be fastened to the top plate with 32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws or 32mm x 7g GIB® Grabber® Dual Thread screw at 300mm centres maximum.

Linings are fastened to metal using 25mm x 6g GIB® Grabber® Self Tapping screws and to timber framing using 32mm x 6g GIB® Grabber® High Thread screws. Alternatively 32mm x 7g GIB® Grabber® Dual Thread screws can be used in both cases. Fastener centres are specified on p.18.

Coved ceiling diaphragms can be achieved by using nominally 32 x 32 x 0.55mm proprietary galvanised metal angles ("back-flashing") at the changes in direction. These angles shall be:

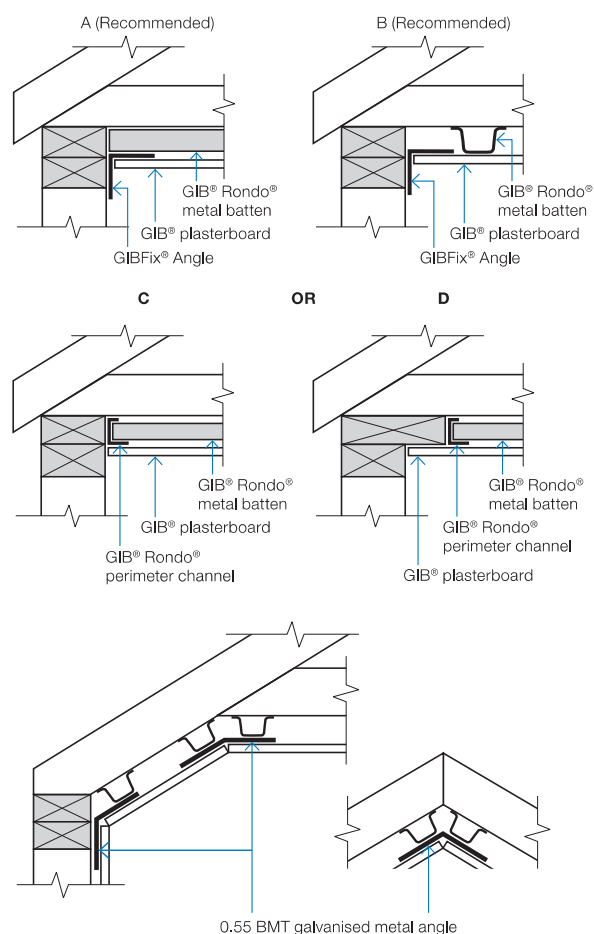
- Fastened at 300mm on each edge to metal battens using 32mm x 8g GIB® Grabber® Wafer Head Self Tapping screws or 32mm x 7g GIB® Grabber® Dual Thread screws.
- Fastened to timber framing using 32mm x 7g GIB® Grabber® Dual Thread screws when linings are installed.

FIGURE 26: GIB® RONDO® METAL CEILING BATTEN INSTALLATION



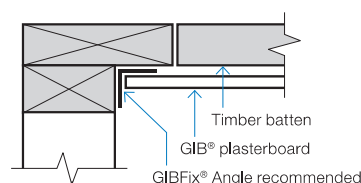
GEB016

FIGURE 27: GIB® RONDO® METAL CEILING BATTENS WITH CORNER ANGLES



GEB017

FIGURE 28: TIMBER CEILING BATTENS*



GEB018

Openings in ceiling diaphragms

SMALL OPENINGS

Small opening (e.g. down lights) of 90 x 90mm or less may be placed no closer than 90mm to the edge of the ceiling diaphragm.

LARGE OPENINGS

Openings are allowed within the middle third of the diaphragms length and width. Fixing of sheet material to opening trimmers shall be at 150mm centres. Neither opening dimension shall exceed a third of the diaphragm width. Larger openings or openings in other locations require specific engineering design.

Where fireplace flue or range hood openings are required in a ceiling diaphragm use a galvanised metal backing plate as shown in figure 25, with a maximum hole diameter of 350mm.

Figure 25 can also be used for range hood openings in walls.

For information on openings in ceiling diaphragms contact the GIB® Helpline on 0800 100 442.

FIGURE 24: LARGE OPENINGS IN CEILING DIAPHRAGMS

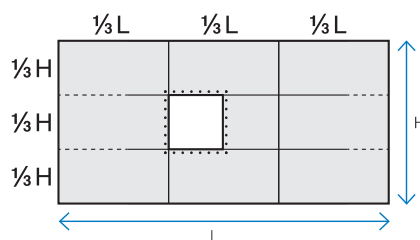
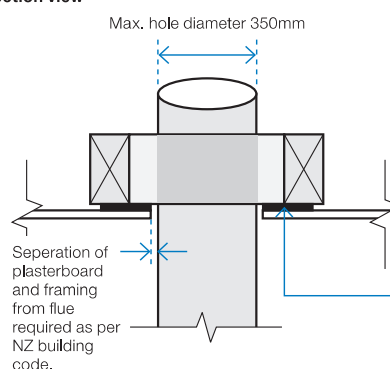


FIGURE 25: FIREPLACE FLUES AND RANGE HOOD OPENINGS

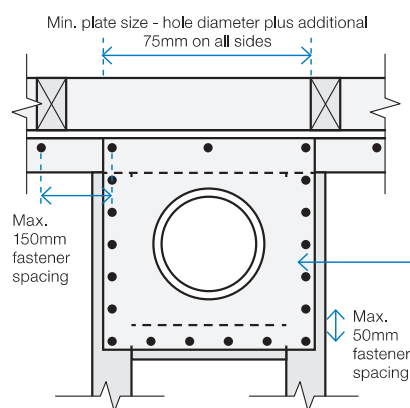
Section view



Steel plate
0.55 BMT
Galvanised sheet
Max. opening
350mm diameter.
Installed prior to
GIB® plasterboard.

Framing
90 x 45mm framing
trimmed to provide
extra fixing.

Plan view



GIB® plasterboard ceiling
Installed over the
steel plate and into
framing using a
minimum of 32mm
x 6g GIB® Grabber
High Thread or
32mm x 7g GIB®
Grabber Dual Thread
screws at 50mm
max centre spacing.

Plasterboard ceiling not shown in plan view

Length of GIB EzyBrace® elements ('N' Type)

The length of GIB EzyBrace® elements with an 'N' extension (requiring standard NZS3604:2011 plate connections) can be taken as the full frame length measured from the outside of the end-stud to the opening face as illustrated in figures 29-32.

'N' type GIB EzyBrace® elements are identified by GIB® specification numbers GS1-N, GS2-N and GS2-NOM

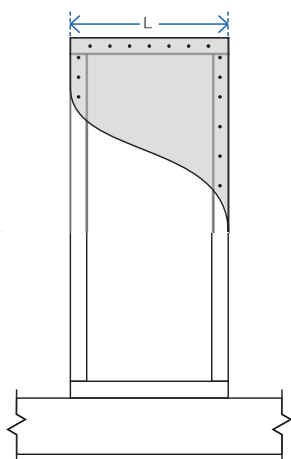
The dimension 'L' shall not be less than 400mm.

Perimeter bracing fixing for linings of both 'H' and 'N' type elements is along the top and bottom plates, end stud, and doubling stud immediately adjacent to the opening.

Fastener spacings and diagram scales shown in Figures 29–32 are indicative only. Refer to p.23–30 for construction details.

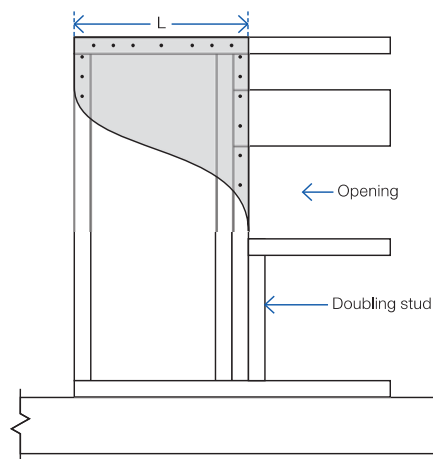
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FIGURE 29: GS BRACING ELEMENTS (OPTION A)



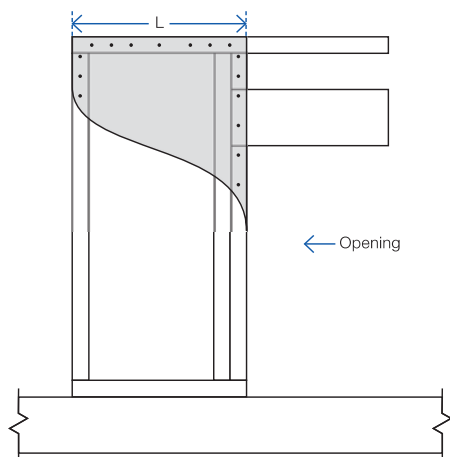
GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 30: GS BRACING ELEMENTS (OPTION B)



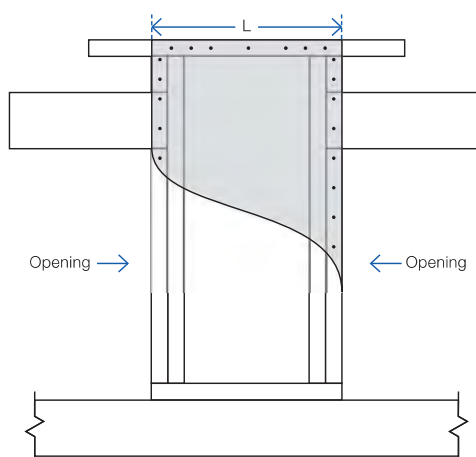
GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 31: GS BRACING ELEMENTS (OPTION C)



GS1-N, GS2-N elements
'L' indicates the length of the bracing element

FIGURE 32: GS BRACING ELEMENTS (OPTION D)



GS1-N, GS2-N elements
'L' indicates the length of the bracing element

Length of GIB EzyBrace® elements ('H' Type)

GIB EzyBrace® elements with an 'H' extension (requiring special panel hold-down fixings) can be used when the dimension 'L' as illustrated in figures 33–36 is 400mm or more.

'H' type GIB EzyBrace® elements are identified by GIB® specification numbers GSP-H, BL1-H, BLG-H and BLP-H.

The length of an 'H' type element is not only determined by the sheet material, but also by the placement of the hold-down fixings.

Hold-down fixings cannot be placed closer together than what is shown for the standard panel in figure 33.

Hold-down fixings can be placed under windows provided sill trimming studs beneath the opening are connected to the bracing element using 8/90mm gun nails, as illustrated in figure 34.

Spike doubling stud to trimming stud using a minimum of 2/90mm gun nails at 600mm centres. Lintel straps (where required for wind uplift) should be checked in and be located away from the bracing element fasteners.

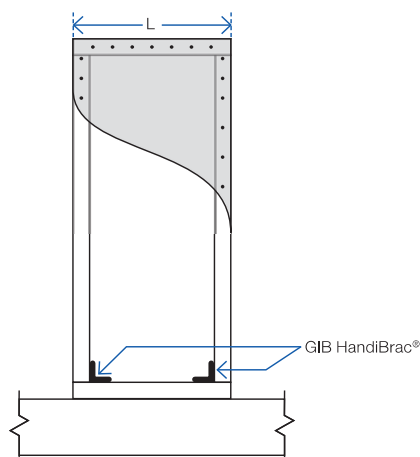
Perimeter bracing fixing for linings of both 'H' and 'N' type elements is along the top and bottom plates, end stud, and doubling stud immediately adjacent to the opening as indicated in figures 34-36.

When using bracing straps, installed in accordance with p.17, fix the strap to the same framing member as shown for the GIB Handibrac® below, and install the adjacent anchor bolt in the same position as the GIB Handibrac® bolt.

Fastener spacings and diagram scales shown in figures 33–36 are indicative only. Refer to p.23–30 for construction details.

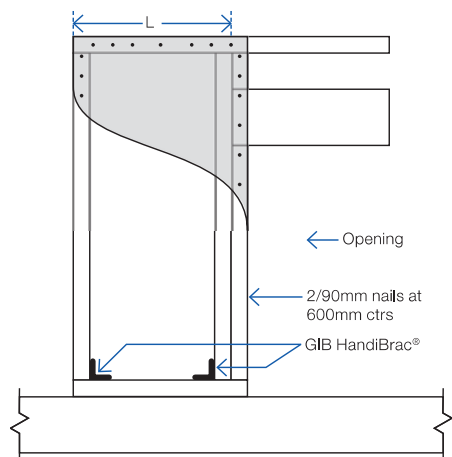
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FIGURE 33: BL BRACING ELEMENTS (OPTION A)



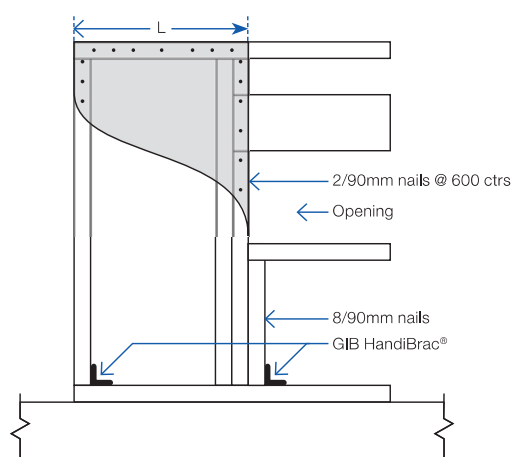
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 35: BL BRACING ELEMENTS (OPTION C)



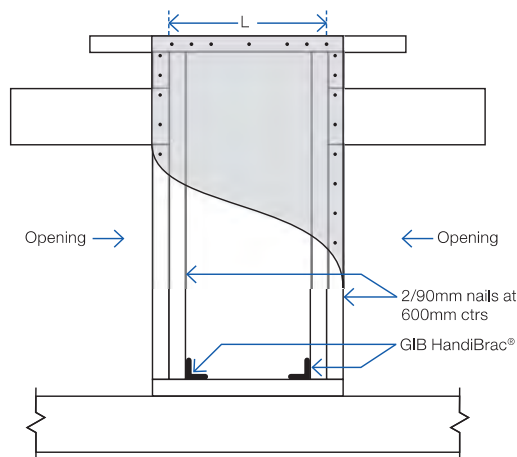
'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 34: BL BRACING ELEMENTS (OPTION B)



'H' type elements with specific hold downs
'L' indicates the length of the bracing element

FIGURE 36: BL BRACING ELEMENTS (OPTION D)



'H' type elements with specific hold downs
'L' indicates the length of the bracing element

GIB EzyBrace® Systems specification GS1-N

Specification code	Minimum length (m)	Lining requirement
GS1-N	0.4	Any 10mm or 13mm GIB® Standard plasterboard to one side only

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Internal Wall Bracing Lines: In accordance with the requirements of NZS 3604:2011 for internal wall plate fixing or 75 x 3.8mm shot fired fasteners with 16mm discs spaced at 150mm and 300mm from end studs and 600mm centres thereafter.

External Wall Bracing Lines: In accordance with the requirements of NZS 3604:2011 for external wall bottom plate fixing.

WALL LINING

- Any 10mm or 13mm GIB® plasterboard lining.
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

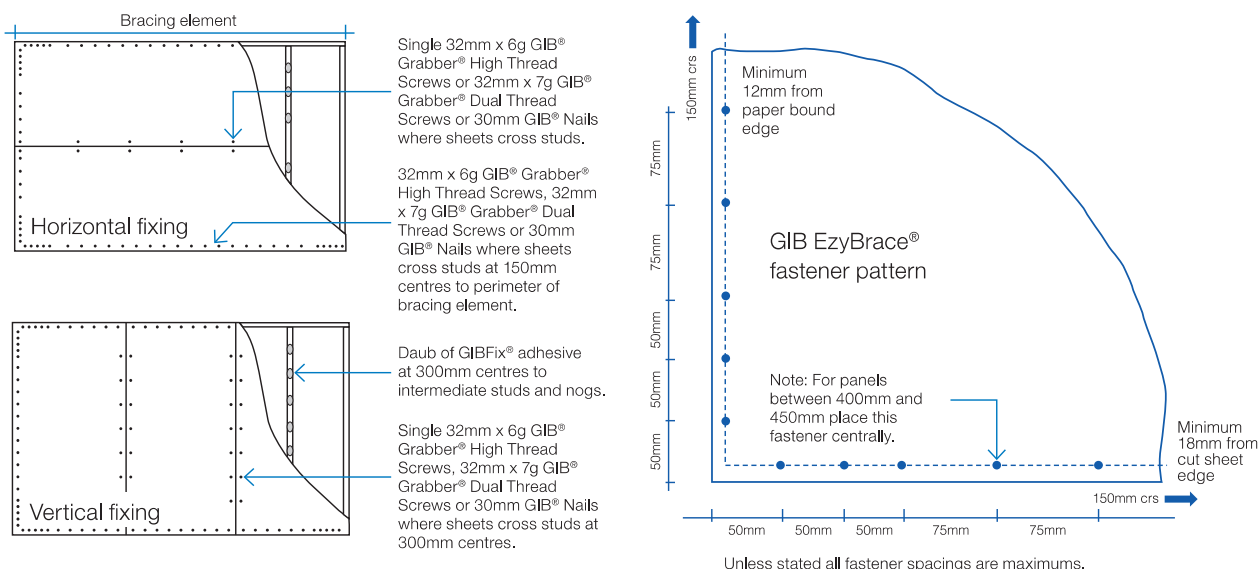
Fastener centres

50,100,150, 225, 300mm maximum from each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.

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Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
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In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification GS2-NOM

Specification code	Minimum length (m)	Lining requirement
GS2-NOM	0.4	Any 10mm or 13mm GIB® Standard plasterboard fixed to each side of the wall framing

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Pairs of hand driven 100mm x 3.75mm nails at 600mm centres; or three power driven 90mm x 3.15mm nails at 600mm centres.

Concrete floor

Internal Wall Bracing Lines: In accordance with the requirements of NZS 3604:2011 for internal wall plate fixing or 75mm x 3.8mm shot fired fasteners with 16mm discs spaced at 150mm and 300mm from end studs and then 600mm centres thereafter.

WALL LINING

- A layer of 10mm or 13mm GIB® plasterboard to each side of the wall.
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Angle use 32mm x 7g GIB® Grabber® Dual Thread Screws.

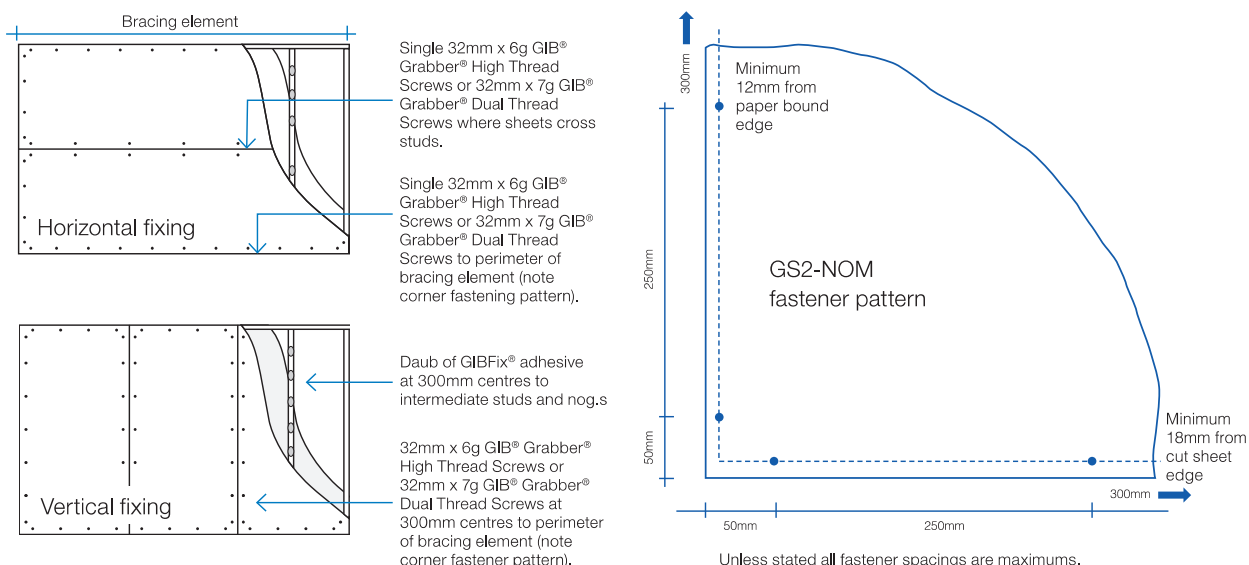
Fastener centres

50, 300mm from each corner and 300mm maximum thereafter around the perimeter of the bracing element. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.

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GS2-NOM ADHESIVE FIXING OPTION AT DOOR JAMBS

As an alternative to using screw fixings, a continuous 6-10mm bead of solvent based GIBFix® All-Bond can be applied along the full height studs immediately adjacent to an internal door opening and at the door lintel or head trimmer. The lining is then bedded into the adhesive and installed into the rebated jamb, as shown in figure 38.

This solvent based adhesive option may only be used with GS2-NOM specification and is designed to reduce popping of fasteners around door openings on internal walls.

FIGURE 37: SCREW FIX FOR OPENINGS

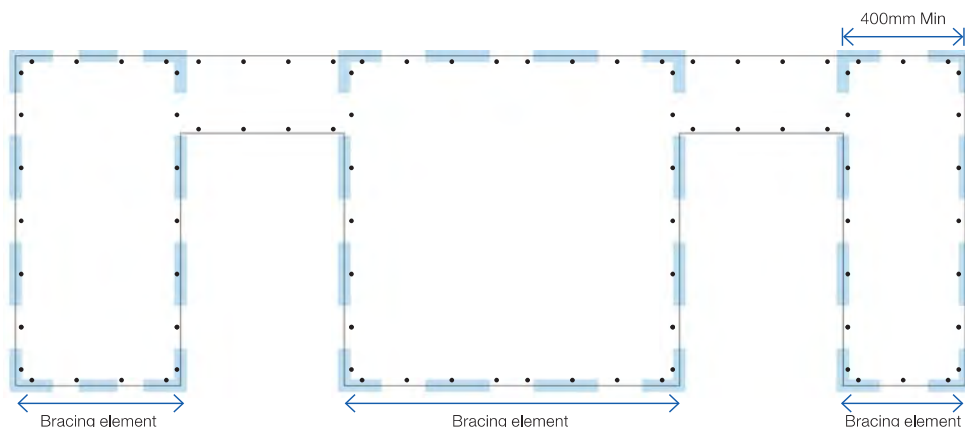
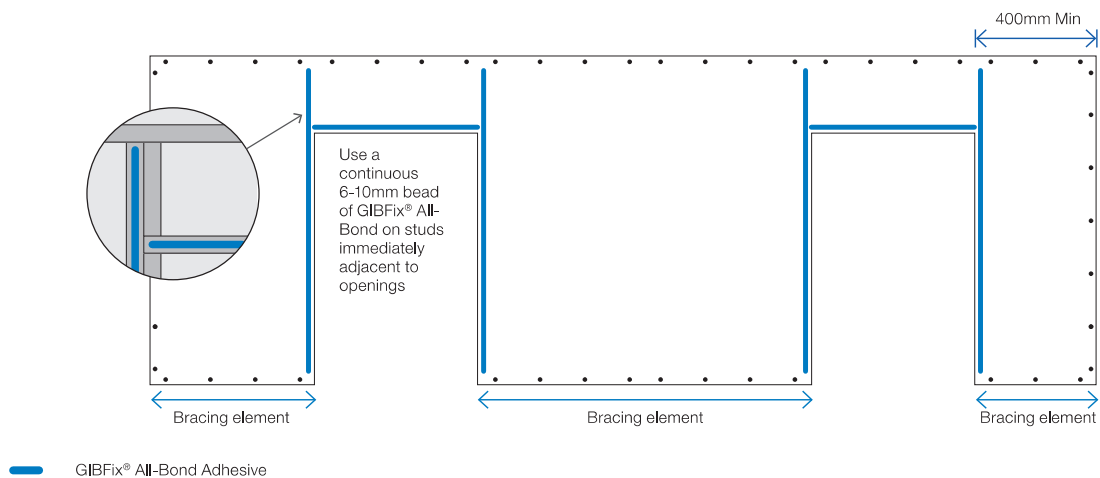
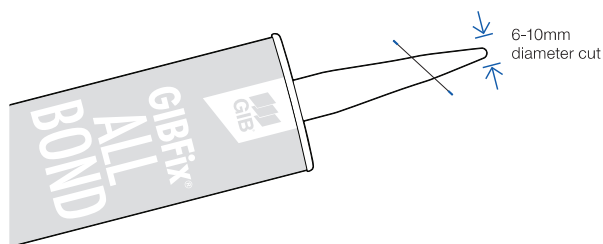


FIGURE 38: SCREW AND ADHESIVE FIX FOR OPENINGS



ADHESIVE NOZZLE APERTURE



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GIB EzyBrace® Systems specification GS2-N

Specification code	Minimum length (m)	Lining requirement
GS2-N	0.4	Any 10mm or 13mm GIB® Standard plasterboard fixed to each side of the wall framing

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber Floor

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Internal Wall Bracing Lines: In accordance with the requirements of NZS 3604:2011 for internal wall plate fixing or 75 x 3.8mm shot fired fasteners with 16mm discs spaced at 150mm and 300mm from end studs and then 600mm centres thereafter.

WALL LINING

- A layer of 10mm or 13mm GIB® plasterboard to each side of the wall.
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

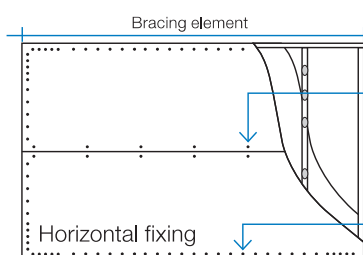
32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails. If using the GIBFix® Angle use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

50,100,150, 225, 300mm maximum from each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

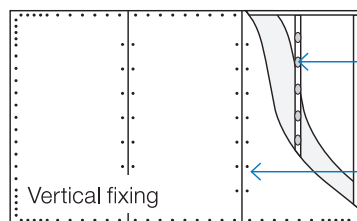
JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.



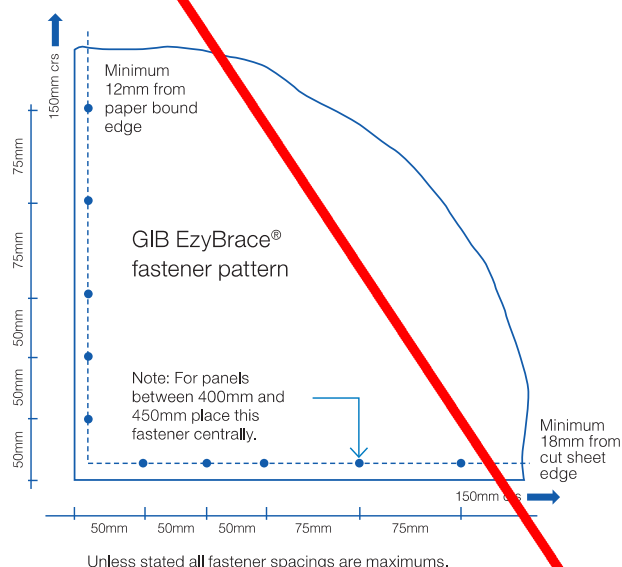
Single 32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails at 150mm centres to perimeter of bracing element.

32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails at 150mm centres to perimeter of bracing element.



Daub of GIBFix® adhesive at 300mm centres to intermediate studs and noggs.

Single 32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails at 300mm centres.



In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification GSP-H

Specification Code	Minimum length (m)	Lining requirement	Other requirements
GSP-H	0.4	Any 10mm or 13mm GIB® plasterboard lining to one side of framing and minimum 7mm structural plywood manufactured to AS/NZ 2269.0 :2012 to the other side	Hold downs

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide.

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of NZS 3604:2011.

WALL LINING

- A layer of 10mm or 13mm GIB® plasterboard to one side of the wall plus minimum 7mm structural plywood manufactured to AS/NZ 2269.0 :2012 to the other side.
- Sheets can be fixed vertically or horizontally, with edges supported.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

32mm x 6g GIB® Grabber® High Thread Screws, 32mm x 7g GIB® Grabber® Dual Thread Screws or 30mm GIB® Nails.

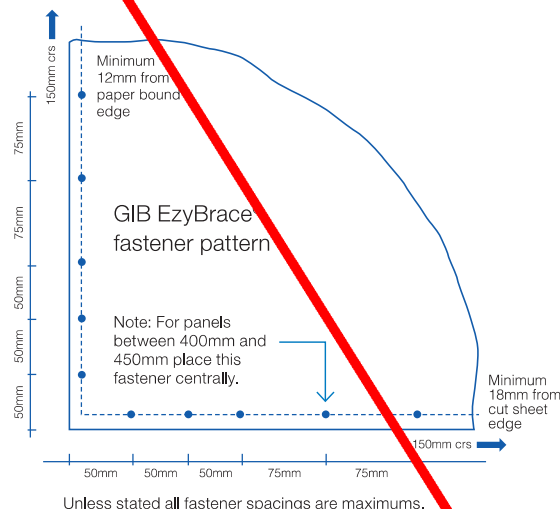
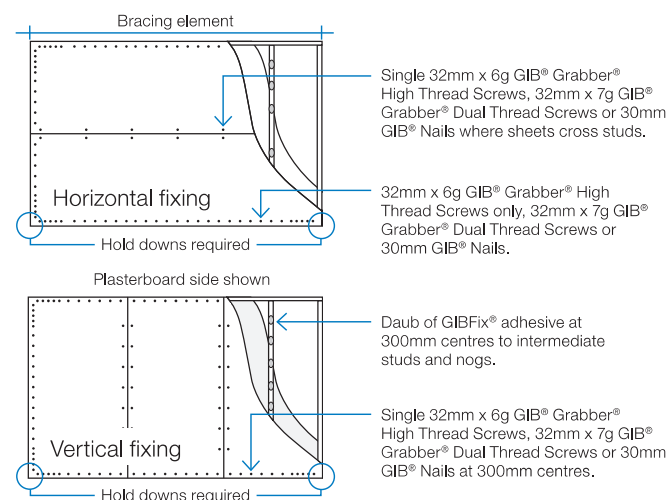
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails.

Fastener centres

GIB® plasterboard side: 50,100,150, 225, 300mm maximum from each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to the intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge. Plywood side: 150mm centres to the perimeter of each sheet. GIB® corner fastener pattern does not apply to the plywood side. 300mm centres to intermediate studs.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.



In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification BL1-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BL1-H	0.4	10mm or 13mm GIB Braceline® to one side only	Hold downs

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide.

Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or
Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of NZS 3604:2011.

WALL LINING

- A layer of 10mm or 13mm GIB Braceline®
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

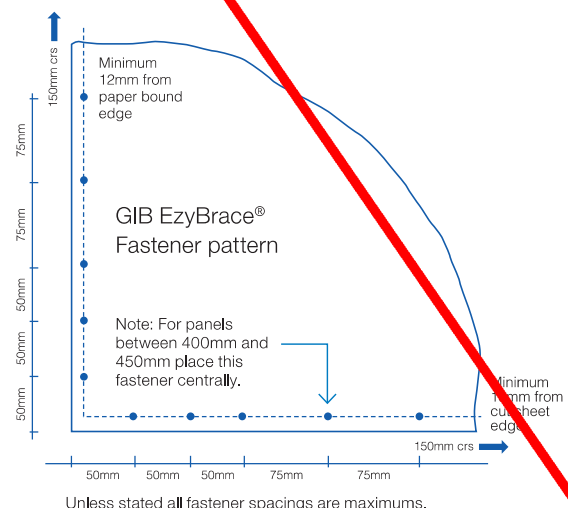
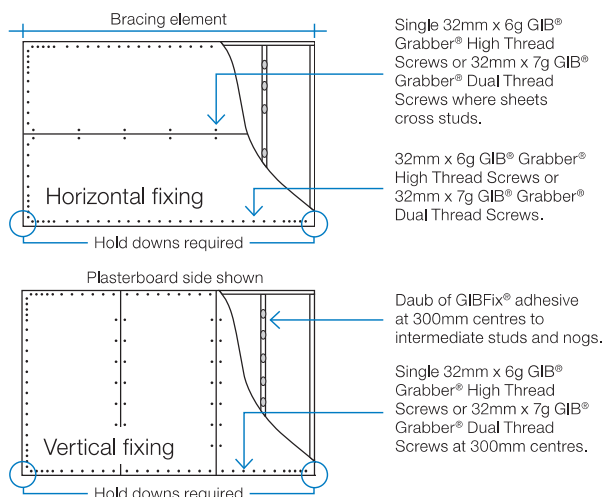
32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

50,100,150, 225, 300mm from maximum each corner and 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to the sheet joint. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.



In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification BLG-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BLG-H	0.4	10mm or 13mm GIB Braceline® to one side of the frame plus any 10mm or 13mm GIB® plasterboard to the other side	Hold downs

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure B/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Pairs of hand driven 100 x 3.75mm nails at 600mm centres; or Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems 2011 or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of NZS 3604:2011.

WALL LINING

- A layer of 10mm or 13mm GIB Braceline® to one side of the wall plus any 10mm or 13mm GIB® plasterboard lining to the other side.
- Sheets can be fixed vertically or horizontally.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. Other side: 32mm x 6g GIB® Grabber® High Thread Screws, 30mm GIB Nails or 32mm x 7g GIB® Grabber® Dual Thread Screws.

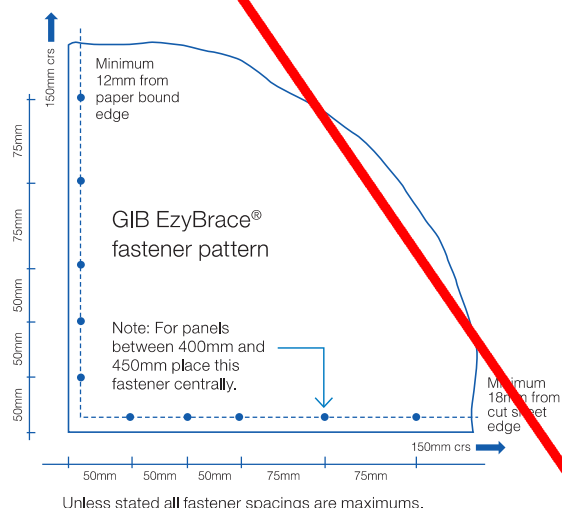
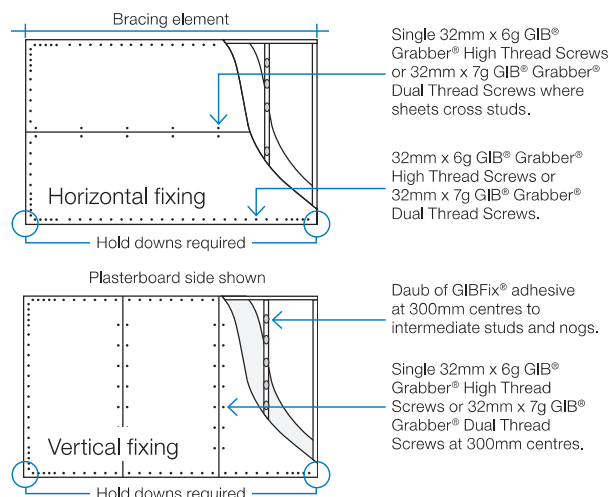
If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

50,100,150, 225, 300mm maximum from each corner and then 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm maximum centres to the intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm maximum centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.



In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems

GIB EzyBrace® Systems specification BLP-H

Specification code	Minimum length (m)	Lining requirement	Other requirements
BLP-H	0.4	10mm or 13mm GIB Braceline® to one side of the frame plus minimum 7mm structural plywood manufactured to AS/NZ 2269.0 :2012 to the other side	Hold downs

WALL FRAMING

Wall framing to comply with;

- NZBC B1 — Structure; B1/AS1 Clause 3 Timber (NZS 3604:2011).
- NZBC B2 — Durability B2/AS1 Clause 3.2 Timber (NZS 3602).

Framing dimensions and height as determined by NZS 3604:2011 stud and top plate tables for load bearing and non-bearing walls. The use of kiln dried stress graded timber is recommended.

BOTTOM PLATE FIXING

Timber floor

Use panel hold downs at each end of the bracing element. The GIB® HandiBrac is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide.

Pairs of hand driven 100 x 3.75mm nails at 600mm centres, or Three power driven 90 x 3.15mm nails at 600mm centres.

Concrete floor

Use panel hold downs at each end of the bracing element. The GIB HandiBrac® is recommended. See details in GIB EzyBrace® Systems or GIB® Site Guide. Within the length of the bracing element bottom plates are to be fixed in accordance with the requirements of AS/NZ 2269/0 :2012.

WALL LINING

- A layer of 10mm or 13mm GIB Braceline® to one side of the wall plus minimum 7mm structural plywood manufactured to AS/NZS 2269.0 :2012 to the other side.
- Sheets can be fixed vertically or horizontally.
- Plywood is to be fixed vertically with edges supported.
- Sheet joints shall be touch fitted.
- Use full length sheets where possible.

PERMITTED ALTERNATIVES

For permitted GIB® plasterboard alternatives refer to p. 5 in GIB EzyBrace® Systems literature.

FASTENING THE LINING

Fasteners

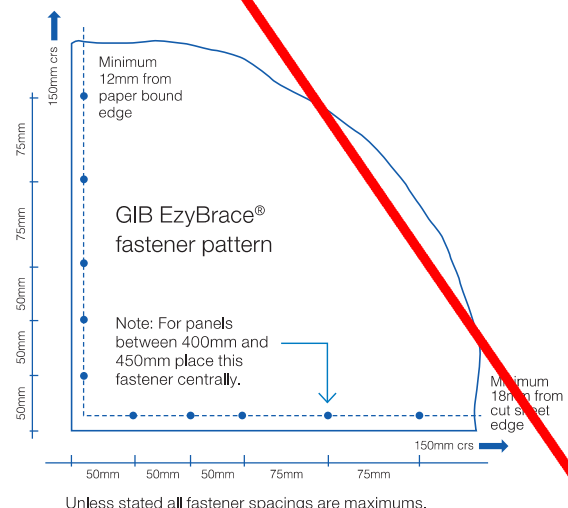
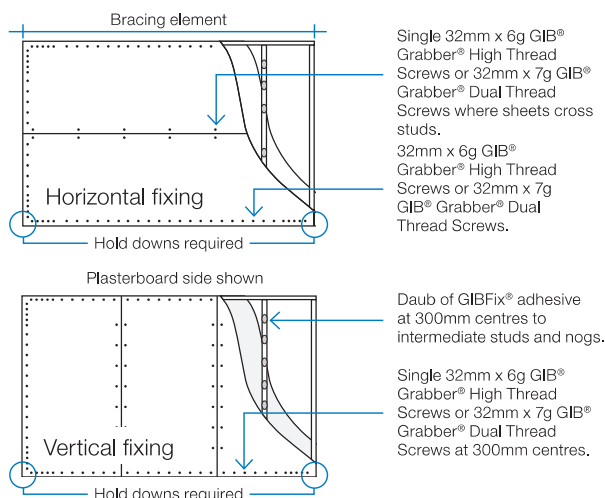
GIB Braceline® side: 32mm x 6g GIB® Grabber® High Thread Screws or 32mm x 7g GIB® Grabber® Dual Thread Screws. Plywood: 50 x 2.8mm Galv or Stainless steel annular grooved FH nails. If using the GIBFix® Framing System or if fastening through GIBFix® Angles use only 32mm x 7g GIB® Grabber® Dual Thread Screws.

Fastener centres

GIB® Plasterboard side: 50,100,150, 225, 300mm from each corner and then 150mm thereafter around the perimeter of the bracing element. For vertically fixed sheets place fasteners at 300mm centres to the intermediate sheet joints. For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud. Use daubs of GIBFix® adhesive at 300mm centres to intermediate studs. Place fasteners no closer than 12mm from paper bound sheet edges and 18mm from any sheet end or cut edge. Plywood side: 150mm centres to the perimeter of each sheet. GIB® corner fastener pattern does not apply to the plywood side. 300mm centres to intermediate studs.

JOINTING

Joint strength is important in delivering bracing system performance. All fastener heads stopped and all sheet joints GIB® Joint Tape reinforced and stopped in accordance with the GIB® Site Guide.



In order for GIB® systems to perform as tested, all components must be installed exactly as prescribed. Substituting components produces an entirely different system and may seriously compromise performance. Follow the specifications. This specification sheet is issued in conjunction with the publication GIB EzyBrace® Systems



Winstone Wallboards is committed to protecting the environment. Environmental matters are integrated into all business activities:

- Our operations strive to exceed all environmental regulatory requirements at all times.
- Protection of the environment is a day to day responsibility that we all must accept.
- We allocate appropriate management time and resources to address relevant environmental issues and continuously improve our activities in that area.
- We will achieve our standards of performance through positive action, employee involvement and constant communication with our neighbours, local authorities and customers.

Minimise on-site waste when designing and/or installing GIB® Systems. For larger projects give consideration to our cut-to-length service to reduce waste. GIB® plasterboard off-cuts, if separated from other waste building materials, can be readily recycled.

For larger projects waste can be diverted to compost manufacturers who grind up the GIB® plasterboard and use it in compost. For smaller projects, the GIB® plasterboard can be ground up and spread around the building site.

GLOBAL GREENTAG^{CERT™}

The Global GreenTag^{Cert™} certified eco-label acknowledges product as meeting the GreenRate Standard set by Global GreenTag^{Cert™}.

GIB® plasterboard has a Level B green rating.

DECLARE CERTIFICATION

Declare is a database of non-toxic, sustainably sourced building products.

Many GIB® plasterboard products including GIB® Standard, GIB Braceline®, GIB Noiseline® and GIB Aqualine® have achieved Red List Free status in Declare certification.

For more information on Winstone Wallboards sustainability commitments visit gib.co.nz.

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TRADEMARKS

The names GIB®, GIB Fyrelime®, GIB Ultraline®, GIB Braceline®, GIB Toughline®, GIB Noiseline®, GIB Aqualine®, GIB Nail®, GIB Tradeset®, GIB Plus 4®, GIB-Cove®, GIB Lite Blue®, GIBFix®, the colour mauve for GIB Toughline®, GIB HandiBrac®, GIB EzyBrace®, the colour blue for GIB Braceline®, the colour pink for GIB Fyrelime®, the colour green for GIB Aqualine®, and the shield device are registered trademarks of Fletcher Building Holdings Limited.

PATENTS

GIBFix® Framing System and GIB EzyBrace® Systems, including componentry and design method, have patents pending (NZ Patent Number 596691, NZ Patent 709159 pending) and design and other IP rights.



FOR MORE INFORMATION VISIT

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OR CALL THE GIB® HELPLINE

0800 100 442

3.3 ECOPLY® BRACING SPECIFICATION - EPI

Table 10: Singled Sided Structural Plywood Brace

Specification No.	Minimum Wall Length	Lining Requirements	BU's/m Wind	BU's/m Earthquake
EPI_0.4	0.4 m	Ecoply one side	80	95
EPI_0.6	0.6 m	Ecoply one side	95	105
EPI_1.2	1.2 m	Ecoply one side	120	135

Framing

Wall framing must comply with:

- NZBC B1 - Structure: ASI Clause 3 Timber (NZS 3604)
- NZBC B2 - Durability: ASI Clause 3.2 Timber (NZS 3602)

Framing dimensions and height are as determined by the NZS 3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe® of SG8 stress grade minimum, is recommended.

Bottom plate fixing

Use GIB Handibrac® hold-down connections at each end of the bracing element. Refer to manufacturer installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604.

Lining

One layer of 7 mm, 9 mm or 12 mm Ecoply plywood fixed directly to framing. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3 mm expansion gap should be left between sheets.

Fastening the Ecoply® panels

Fasten with 50 x 2.8 mm hot dipped galvanised or stainless steel flat head nails for direct fix. Place fasteners no less than 7 mm or 3 fastener diameters from sheet edges. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

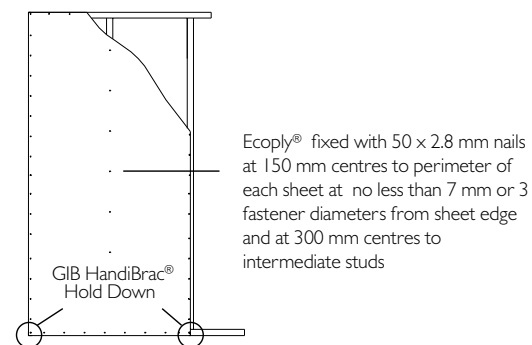
Fasteners for H3.2 CCA treated Ecoply® panels

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised.

In certain circumstances stainless steel fasteners may be required. Refer to Table 8 of the Ecoply Specification and Installation Guide for these circumstances and further fastener selection advice. Where stainless steel nails are required, annular grooved nails must be used.

Fastening centres

Fasteners are placed at 150 mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs. Where more than one sheet forms the brace element each sheet must be nailed off independently.



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Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZS 3604:2011 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply manufactured by Carter

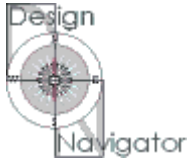
Holt Harvey and SG8 timber framing, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB Handibrac® are registered trade marks of Fletcher Building Holdings Ltd.

SEPTEMBER 2015

SECTION 4

H1 Calculations

Risk Matrix [Refer to Sheets 07 & 08](#)



Design Navigator H1 Compliance Report

Project Summary

H1 Report created by:	GJGardner
Project Name:	6500470 Foote
Client:	Foote
Lot No:	20
Comment:	
Project Id:	104458
Report Date:	15/09/2017

Compliance Result

This report shows compliance of the design with Clause H1 Fourth edition Amendment 3 from January 2017 and the R-value targets of Clause E3 Second edition Amendment 6 from January 2017.

This building complies with H1 via the following methods:

- the Schedule Method in NZS4218:2009
- the Calculation Method in NZS4218:2009

H1 Compliance Details

NZS4218:2009 Schedule Method Compliance

The use of the Schedule Method is permitted .

In order to comply the R-values for all the construction elements must be the same or larger than the permitted minimum R-values. This design **complies** with the NZS4218:2009 Schedule Method.

Non-Solid Construction			
	Permitted Minimum	Proposed Minimum	
Floor:	1.3	1.35	✓
Non-solid Walls:	2	2.21	✓
Glazing in Non-solid Walls:	0.26	0.26	✓
Roof:	3.3	3.59	✓
Skylights:	0.31		✓

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Notes:

If multiple solid wall types levels are used the table shows the requirements for the corresponding walls and windows in them. For solid timber and for other solid constructions two options are shown for each. But the components of these options can not be mixed, i.e. it is not permitted to use the solid timber wall R-value from option 1 and the solid timber window R-value from option 2.

NZS4218:2009 Calculation Method Compliance

The use of the Calculation Method is permitted .

In order to comply the Actual Heat Loss must be the same or smaller than the Reference Heat Loss AND all component R-values must be the same or larger than 50% of the R-values in the '50% Rule' table below. This design **complies** with the NZS4218:2009 Calculation Method.

HeatLoss:

Reference building	Proposed building
360	325

Minimum R-values ("50% rule"):

	Permitted Minimum	Proposed Minimum	
Floor:	0.65	1.35	✓
Non-solid Walls:	1	2.21	✓
Roof:	1.65	3.59	✓

The Reference building has the following areas and R-values.

		Non-solid	Solid Timber	Other Solid
		100.0	0.0%	0.0%
Floor:	Area: 137.9 m ² R-values:	1.3	1.3	1.5
Walls excl. glazing:	Area: 98.6 m ² R-values:	2	1.4	1.2
Glazing (up to 30%):	Area: 42.2 m ² R-values:	0.26	0.26	0.26
Glazing (surplus of 30%):	Area: 0 m ² R-values:	0.4	0.34	0.34
Roof:	Area: 137.9 m ² R-values:	3.3	3.5	3.5
Heat Loss:		360	378	376

For mixed constructions the heat loss of the reference building is calculated as the sum of the heat losses for each type of wall construction multiplied by the fraction of the wall area of each type. This approach is based on clause 4.2.6 of NZS4218:2009.

There are no skylights in the reference building. The reference building roof area is the sum of the proposed building roof and skylight areas.

Compliance with Clause E3

This building complies with the R-value targets in NZBC Clause E3 .

Component	Minimum R-value	Project R-value
Framed wall constructions with cavities	1.5	2.21
Single skin masonry wall without a cavity	0.6	
Solid timber wall no less than 60 mm thick	0.6	
Roof or ceilings	1.5	3.59

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Design Details

Building Dimensions

Floor Area	<input type="text" value="137.9"/> m ²
Gross Wall Area	<input type="text" value="140.8"/> m ²
Net Wall Area	<input type="text" value="105"/> m ²
Wall (North) Area	<input type="text" value="29"/> m ²
Wall (East, South and West) Area	<input type="text" value="76"/> m ²
Gross Roof Area	<input type="text" value="137.9"/> m ²
Net Roof Area	<input type="text" value="137.9"/> m ²
Glazing Area	<input type="text" value="35.8"/> m ²
Window (North) Area	<input type="text" value="12.1"/> m ²
Window (East, South and West) Area	<input type="text" value="23.7"/> m ²
Skylight Area	<input type="text" value="0"/> m ²

Glazing Areas

Total Vertical Glazing Percentage	<input type="text" value="25.4"/> %
East, South and West Window Percentage	<input type="text" value="23.8"/> %
Total over 30%	<input type="text" value="no"/>
East, South and West over 30%	<input type="text" value="no"/>
Total over 50%	<input type="text" value="no"/>
max. Skylight Area for Schedule Method	<input type="text" value="2.07"/> m ²
Skylights over Schedule Method Limit	<input type="text" value="no"/>
Decorative Glazing	<input type="text" value="0"/> m ²
Decorative Glazing over 3m ²	<input type="text" value="no"/>

Information required for BPI calculation

Living Floor Area	<input type="text" value="0"/> m ² Note: This includes also internal floors.
Average Room Height	<input type="text" value="0"/> m

Thermal Mass Level

Suspended timber floor with timber framed walls
or a heavily carpeted slab floor with timber
framed walls.

Climate

Location	<input type="text" value="Christchurch"/>
Climate Zone	<input type="text" value="3"/>

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Heat Loss Details

	ID	Orient.	Width	Height	Gross Area	Net Area	R-value*	Heat Loss	Shad. Coeff.**	Solid Wall***
<u>Floors</u>										
Floor 1	F				137.9	137.9	1.35	102.1		
<u>Walls</u>										
Wall 1	N	N	16.8	2.5	41.1	29.0	2.21	13.1		C
Window 1-1	152SP		1.5	2.0		3.0	0.26	11.7	0.00	
Window 1-2	152SP		1.5	2.0		3.0	0.26	11.7	0.00	
Window 1-3	152SP		1.5	2.0		3.0	0.26	11.7	0.00	
Window 1-4	152SP		1.5	2.0		3.0	0.26	11.7	0.00	
Wall 2	E	E	11.9	2.5	29.3	17.0	2.23	7.6		C
Window 2-1	364		2.7	2.1		5.7	0.26	21.9	0.00	
Window 2-2	354		1.8	2.1		3.8	0.26	14.6	0.00	
Window 2-3	112		0.9	0.9		0.8	0.26	3.1	0.00	
Window 2-4	123		1.5	1.4		2.0	0.26	7.8	0.00	
Wall 3	S	S	9.9	2.5	24.4	20.8	2.23	9.3		C
Window 3-1	123		1.5	1.4		2.0	0.26	7.8	0.00	
Window 3-2	113		1.2	0.9		1.1	0.26	4.2	0.00	
Window 3-3	138		0.5	0.9		0.5	0.26	1.7	0.00	
Wall 4	SG	S	6.8	2.5	16.7	16.7	2.24	7.5		C
Wall 5	W	W	7.5	2.5	18.3	10.5	2.21	4.8		C
Window 5-1	332		1.4	2.1		3.0	0.26	11.4	0.00	
Window 5-2	132SP		2.4	2.0		4.8	0.26	18.6	0.00	
Wall 6	WG	W	4.5	2.5	11.0	11.0	2.24	4.9		C
<u>Roofs</u>										
Roof 1	R				137.9	137.9	3.59	38.4		
<u>Total Heat Loss</u>								325.5		

* Any concrete slab-on-ground floor regardless of its dimensions can be assumed to have an R-value of at least R-1.3 (H1/AS1 2.1.5).

** The Shading Coefficient is only required for BPI calculations.

*** C: Cavity Construction (any construction that is not solid), T: Solid Timber, S: Other Solid Construction (Note that the use of solid timber and other solid construction types is discretionary, i.e. solid timber walls and other solid walls can be treated as if they are non-solid (NZS4218:2009 section 4.1.3.).)







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Floor Construction Details**Name:**

Floortype 1

1.35
m²K/W

Type: Floor: Slab floor

internal surface 0.09	
Flooring :	
none (Example: polished surface of a concrete floor) ▼	
R-value: 0.00	
Slab Insulation	
Slab floor area [m²]:	137.90
Perimeter length [m]:	57.37
External wall thickness [mm]:	90 
Soil conductivity [W/m °C]	1.2 
Underslab insulation:	none ▼
Insulation :	
Piles Footings: Number:	
Penetration Diameter:	
Slab edge insulation:	none ▼
Insulation :	

Wall Construction Details**Name:**

Walltype 1

2.23
m²K/W

Type: Wall: Timber frame with vented cavity

external surface 0.03	
Cladding : 70mm brick ▼	
R-value: 0.06	
Air Barrier : Building paper ▼	
R-value: 0.01	
Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 800mm ▼	
Wall Frame Area: 14.4%	Cavity Area: 85.6%
15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08	15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08
Framing : R-value: 0.75	Pink®Batts® Ultra R2.6 Wall 2.6
	still Airgap: none ▼
	R-value: 0.00
Wall Lining : Gypsum plasterboard 10mm ▼	
R-value: 0.04	
internal surface 0.09	

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Name:

Walltype 2

2.21
m²K/W

Type: Wall: Timber frame with vented cavity

external surface 0.03	
Cladding : Fibre cement board 1470 9mm ▼ R-value: 0.04	
Air Barrier : Building paper ▼ R-value: 0.01	
Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 800mm ▼ Wall Frame Area: 14.4% Cavity Area: 85.6%	
15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08	15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08
Framing : R-value: 0.75	Pink®Batts® Ultra Steel R2.6 Wall 2.6
	still Airgap: none ▼ R-value: 0.00
Wall Lining : Gypsum plasterboard 10mm ▼ R-value: 0.04	
internal surface 0.09	

Name:

Walltype 3

2.24
m²K/W

Type: Wall: Timber frame with vented cavity

external surface 0.03	
Cladding : Gypsum plasterboard 10mm into still air (garage, etc.) ▼ R-value: 0.10	
Air Barrier : none ▼ R-value: 0.00	
Timber Frame & Cavity : 90mm, studs @ 600mm, dwangs @ 800mm ▼ Wall Frame Area: 14.4% Cavity Area: 85.6%	
15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08	15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08
Framing : R-value: 0.75	Pink®Batts® Ultra Steel R2.6 Wall 2.6
	still Airgap: none ▼ R-value: 0.00
Wall Lining : Gypsum plasterboard 10mm ▼ R-value: 0.04	
internal surface 0.09	

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Roof Construction Details**Name:**

Rooftype 2

3.59
m²K/W

Type: Roof: Timber framed roof, direct fixed or battened flat ceiling

external surface 0.03	
Roofing : Metal tiles with building paper ▼ R-value: 0.01	
Insulation :	
Timber Frame & Cavity : 90mm rafters or joists @ 900mm, battens (covered with insulation) ▼	
Roof Frame Area: 5.0%	Cavity Area: 95.0%
Roof space (still air) 0.11	Roof space (still air) 0.11
Framing : R-value: 0.75	Pink®Batts® Ultra R4.0 Ceiling 4
Roof Lining : Gypsum plasterboard 13mm ▼ R-value: 0.06	
internal surface 0.09	
Recessed downlights	
Ceiling Area [m ²]: 137.9	Number of downlights: 26
Clearance from lamp holder side [m]:	

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SECTION 5

Specifications

TECHNICAL
(Single Level)
BUILDING SPECIFICATION

FOR

Site Address:

Lot 20 DP 500690
5 Catchpole Place, Two Roads, Woodend

BETWEEN

Owner(s):

James David Foote and Ruqiah Hannah Foote

&

AG and LM McCarthy Ltd, Canterbury North Franchise for

G.J.Gardner. HOMES

"New Zealand's Favourite Home Builder"

Job Number: 6500470

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OWNER(s) : James David Foote and Ruqiah Hannah Foote

SITE ADDRESS : Lot: 20 DP: 500690 Street : 5 Catchpole Place

TERRITORIAL AUTHORITY : Waimakariri District Council

1. GENERAL

- (a) Unless otherwise specified, the works shall be constructed in accordance with the Building Act 2004 (as amended) in conjunction with the New Zealand Building Code.
- (b) Throughout this specification, reference is made to various New Zealand Building Code acceptable solutions (NZBC __/AS_) and verification methods (NZBC __/VM_) for criteria and/or methods used to establish compliance with the Building Act 2004
- (c) Reference is also made to various Standards produced by Standards New Zealand (NZS, AS/NZS, NZS/AS), overseas standards (AS, BS) and to listed Acts, Regulations and various industry codes of practice and practice guides. The latest edition (including amendments and provisional editions)
- (d) Site Safety and Environmental Compliance; G.J. Gardner Homes will make a site specific hazard assessment for each site, in accordance with Acceptable Solution 1 of section F5 of the NZ Building Code. Where the company considers it is necessary to fully exclude the public from the site, temporary fencing in the form of 2m high galvanised chain link netting shall be erected.
- (e) LM is defined as lineal metres

2. EXCAVATION and FILL

- (a) Waffle slabs with gravel raft: Refer to plans for foundation excavation depth. The Builder shall supply and place compacted hardfill and blinding sand to suit the required finished floor level.

3. FOUNDATIONS and SLAB

- (a) TC2/3 Hybrid foundation
- (b) Finished Floor Level 150mm minimum above Finished Ground Level. (subject to cladding selection and the provisions of the NZ Building Code).
- (c) Underslab DPM is 250 micron Black Heavy Duty Polythene.

4. DRAINLAYER

- (a) Sewerage installation to be in accordance with Territorial Authority Approved Plan, and allowed to be connected to existing lateral located at boundary.
- (b) Stormwater allowed to be connected to existing lateral located at boundary.

PRELIMINARY AND GENERAL –

Read and note all clauses under Preliminary and General of this contract where they apply to this trade. All drainage work to comply with the requirements of the NZBC, refer to sections G10-G13.

NZBC E1/AS1 Surface water

NZBC B1/AS1 Structure – general, 6.0 drains

G13/AS2 - Drainage alternatively AS/NZS 3500 Plumbing and Drainage

AS/NZ1260 - PVC pipes and fittings for drains, waste and vent applications

NZS7641 - Unplasticised PVC waste and ventilation pipes, fitting and accessories 32-50mm

NZS7643 - Installation of unplasticised PVC pipe systems

NZS7649 - Unplasticised PVC sewer and drain pipe fittings

Plumbers, Gasfitters and Drainlayers Act 2006

EXTENT OF WORK –

Work in this section of the contract comprises all surface and foul water drainage up to above ground level to connect to plumbers work. Include all pipes and specials, inspection points, fittings, construction of manholes, all gully traps and connections for terminal vents, soil and waste pipes. The drainlayer shall confer with the plumber and shall arrange with the contractor before the foundations are laid to fix the exact position of all connections of wastes and drains.

STANDARD OF WORK –

Experienced and licensed tradesmen to the satisfaction of GJ Gardner Homes shall carry out the whole of the work. The drainage contractor shall allow and arrange for all tests.

MATERIALS –

All materials shall be in accordance with relevant NZ Standards and manufacturers' requirements

CONNECTION TO EXISTING DRAINAGE –

The drainlayer is responsible for verifying the position and depth of the connection and commence laying his drains to this point.

DRAIN TRENCHES –

The excavation of trenches shall be accurately made with base clean and true grade so that no unnecessary filling is required. Adequate width shall be allowed in accordance with depth of drain to enable laying and jointing to be properly carried out. Trenches shall be kept firm and dry and shall be opened up only in lengths that can be protected, utilised and refilled within a reasonable time. See NZBC G13/2 fig. 8 for proximity to buildings. Trenches are to be backfilled with excavated material.

LAYING OF DRAINS –

All drains are to be adequately supported in the bottom of the trench. The pipes are to be laid to straight lines and even grades in accordance with NZBC G13/AS2 table 2 for sizes and gradients. Drains shall be tested to completely tight in accordance with NZS7643: section 11 and NZS4452: section 11.

Backfill drain lines in 150mm layers, without disturbing or damaging drains. Finish off with 150mm of excavated material slightly mounded above the finished ground line to allow for natural settling.

FITTINGS –

The site plan shows the proposed layout of the system, please note, this is diagrammatical and may change at the discretion of the drainlayer due to site conditions. Additional fittings that are normally required, such as inspection points and inspection bends, etc, which may be required but are not specifically shown, must be allowed for by the drainlayer to comply with normal practice under the regulations.

JOINTING OF PIPES –

The pipes are to be joined in a proper manner and provided with adequate maintenance and inspections points as per NZBC G13/AS2.

FALL IN DRAINS –

The whole of the soil and stormwater drain system is to be laid at a regular and even fall.

GULLY TRAPS –

Supply and install all gully traps where shown in accordance with NZBC G13/AS2, 100mm min. above finished ground level. All gully traps are to be fitted with plastic gratings and also a grating or perforated plate above the wastes discharging into it. At least one gully trap (ORG) has its overflow rim at least 150mm below the overflow level of the lowest fixture served by the system.

SEWER AND STORMWATER MAIN CONNECTIONS –

If there is no supplied laterals to the site then the drainlayer shall arrange for the council to provide connections to main public lines where provided and the owner shall pay all charges in connection therewith after first being advised at an early stage by the drainlayer of the need to pay any charges.

COMPLETION –

Supply a 1:100 scale as-built drawing of drains and fittings to the Territorial Authority on completion.

On completion of all work ensure that the site is left in a tidy state.

5. CARPENTER

All timber used in this dwelling is to comply with NZS3602 – Timber and Wood Based Products for use in Building (SG8), Treatments to NZS 3640 and Moisture contents to NZBC E2/AS1 Section 10.2.

Ply used for structural purposes will comply to AS/NZS 2269 Plywood - Structural.
(No produced substitution is permitted where Ecoply is used as a bracing element).

Structural design is to comply with NZBC B1 Structure with all components meeting the requirements NZBC B2 Durability.

The truss designs and lintels beyond the scope of NZS 3604 for this job will comply with the following standard:

NZS 1170 - Structural Design Actions - as an Acceptable Solution for B1/VM1
NZS3603- – Timber Design

Steel lintels and structural steel (as required) will be specified in an Engineer's Producer statement.

Timber framed construction will be as NZS 3604 Timber Framed Buildings except where component selection is varied by Producer Statements. All framing connections and roof connections are as specified in the Drawings or Truss Design and will be subject to the Durability requirements of NZS 3604.

- a) External framing is generally H1.2 treated, 90mm x 45mm SG 8 Radiata at 600mm crs, except as noted otherwise on plans.
- b) , 90mm x 45mm SG 8 Radiata at 600mm crs, except as noted otherwise on plans.
- c) Building wrap is Tekton, except as noted otherwise on plans.
- d) Sill / Opening tape is Thermakraft Aluband tape.
- e) DPC between framing & slab is Plascourse DPC, high impact low density polyethylene film embossed on both sides, or equivalent.
- f) Roof trusses to be to manufacturer's design and treatment as specified above.
- g) Steel ceiling battens at 600 centres to all ceilings.
- h) Ceiling height is 2.4m unless otherwise stated.

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6. FASCIA/GUTTER AND DOWNPIPES

This area will comply with:

NZ Metal Roof and Wall Cladding Code of Practice from the Metal Roofing Manufacturers Association of New Zealand and NZBC E1/AS1 - Surface Water.

- Fascia to be Colorsteel Concept profile or equivalent.
- Gutter to be Colorsteel 'D' gutter or equivalent.
- Downpipes to be Colorsteel or equivalent.
- Down-pipes to discharge into the stormwater drainage system.

7. ROOF COVERING

All roofing to meet the requirements of:

NZBC E2/AS1 External Moisture

NZBC B2 Durability

Metal roofs (where used) will comply with the NZ Metal Roof and Wall Cladding Code of Practice.

- (a) Roof is Gerard pressed metal tile satin finish with barrel or angle trim from Builder's selection and fixed to Manufacturer's specifications.
- (b) Flashings to be 0.55mm BMT, colour to match the roofing.
- (c) Roofing underlay to be Thermakraft 215, except as noted otherwise on plans.

8. SOFFIT LININGS

- (a) Soffits to be 4.5mm Fibre Cement sheeting with PVC jointers.

9. GARAGE DOOR

- (a) Garage Door is to be a 4.8m Windsor sectional type from builder's selection.

10. EXTERIOR WINDOWS & DOORS

- (a) Window & Door frames to be powder coated aluminium and comply with NZS4211:2008
- (b) Glazing to comply with NZS4223 Parts 1,2,4:1999, Part 3:2016
- (c) Double glazed throughout excluding garage.
- (d) Reveals to be grooved square dressed paint finish treated pine.
- (e) Flashings are provided where required by NZBC E2/AS1
- (f) Glass to be clear, except to bathroom(s), WC(s) and ensuite(s) which will be obscure. Bathroom(s) and ensuite(s) to be toughened on inside pane of double glazing.

11. EXTERIOR CLADDING**BRICK**

The bricklaying will comply with:

SNZ HB 4236 NZ Handbook for Masonry Veneer Wall Cladding
NZS 4210 Masonry Construction: Material and Workmanship
NZS 3604 Timber Framed Construction
NZBC B1/AS1 Structure general, 2.0 Masonry
NZBC E2/AS1 External Moisture

PANEL

- (a) Feature areas to be James Hardie Axon 133 grained fitted as per manufacturer's requirements.

12. ELECTRICAL

Standard inclusions as per attached electrical specification

Mains Supply:

Supply from boundary to house

600 x 400mm Galvanised steel meter box supplied and installed by builder as located on plans.

Smoke alarm(s) fitted with hush and test functions.

Electric cooktop.

PRELIMINARY AND GENERAL –

The electrical installation will comply with:

NZBC G8/AS1 Artificial Lighting

NZBC G9/VM1

NZS3000 Electrical Regulations – Buildings, structures and premises

AS/NZS3008 Electrical Installations – Selection of Cables

NZS6401 PVC insulated cables for electric power and lighting

Electrical Regulations 1997

NZ Electrical Codes of Practice

Product compliance

CA-80 or CA-135

Where downlights are to be installed, they will be CA rated downlights as AS/NZS 60598.2.2 downlights class marking. Sufficient lights will be installed to ensure compliance with clause NZBC G8/AS1.

13. PLUMBING / HARDWARE

- (a) Hot water cylinder to be A-grade 250 Lt Mains Pressure complete with tempering valve.
Note: Mains pressure cylinders incorporate a pressure relief pipe which protrudes from foundation, location to be determined by plumber.
- (b) In-line filter and strainer fitted to exterior water entry point.

PRELIMINARY AND GENERAL

As specified on the plans the plumbing will comply with G13/AS1 – Sanitary Plumbing, G13/AS2 Drainage or alternatively AS/NZS 3500 Plumbing and Drainage

All plumbing work to comply with the requirements of the NZBC, refer to sections E3, G10-G15.

AS/NZS1260 - PVC pipes and fittings for drain, waste and vent applications

NZS7641-Unplasticised PVC waste and ventilating pipes, fittings and accessories 32-50mm

AS/NZ4858 - Wet Area Membranes

E3/AS1- Internal Moisture

Plumbers, Gasfitters and Drainlayers Act 2006

EXTENT OF WORK –

Provide for all materials and execution of all works necessary for the proper completion of the plumbing work. All work is to be carried out by tradesmen registered as required by the plumbing and drainage regulations and relevant standard and in accordance with the NZBC and Territorial

Authority requirements. All pipe work is to be concealed where possible within wall spaces, or as indicated on the drawings. The carpenter is responsible for provision of all framing, blocking etc for the support of fittings. Co-operate with all other trades for the provision of ducts, trenches, cut-outs in foundation and slab and the laying of pipe work. Holes for pipes through framing members shall be of minimum size and shall be positioned to ensure structural integrity of framing members are not compromised. Note requirements for any penetrations in wall framing from NZS3604 sections 8.5.1.6 & 8.7.5.

PERMIT, FEES –

Give all notices, and arrange for the inspection of the work and materials.

MATERIALS –

Provide all the materials, labour and plant necessary to complete work in accordance with the drawings and provide specifications, NZBC approved documents as specified in B1/1, E1, G1, G2, G13/1 & G13/2.

All internal pipes shall be polybutylene to DIN8077 and DIN8078 complete with fittings and accessories brand matched. Pressure test all fittings and pipe work and ensure there are no leaks and all fittings are in good working order.

FLASHINGS –

Generally provide all flashings required by all other trades to make the building weather tight. Flash and counter flash all pipes, vents and exhausts with 1.0mm min Butynol or EPDM (or 0.7mm aluminium / 0.55mm BMT galvanised or Aluminium zinc coated flashings or 1.0mm min Butynol for zincalume roofing) neatly capped to roofing or flash with approved paint-on membrane system and paint to match roofing colour.

WATER SUPPLY –

Water is from a municipal supply.

Refer to:

- a) Cold water can be obtained from the existing site connection via a mains pressure system providing adequate water pressure and volume; so avoiding the need for a cold water supply tank in or on the roof. Provide a high pressure mains system.
- b) Water heating is to be by means of a high pressure system; with cold water feed through a pressure reducing valve and separate non-return valve and complete with tempering valve set to maximum delivery temperature of 55° C.

The installation will comply with:

NZBC G12/AS1 Water Supplies
AS2642 Polybutylene pipe fittings
Plumbers, Gasfitters and Drainlayers Act 2006

COLD WATER SUPPLY –

Tap off from mains service lateral with 25mm ID polybutylene pipe and rubber ring compression fittings unless otherwise specified. Excavate trench, lay pipe and back fill to appropriate NZBC and NZS standards. Connect to building reticulation system. Provide a gate valve at the building. Pipe laid in a trench a minimum of 500mm below finished ground level marker tape laid above backfill. Provide pipe to two hose taps, in positions at front and rear of building and to all fittings including hot water cylinder and washing machine. All branches to be short, straight and at as even gradient as possible with easybends used throughout. Use only approved connections throughout. All pipes are to be adequately supported, well secured and where possible concealed. Plumber to discuss with electrician and provide means of electrical earthing, when using any form of metal piping.

HOT WATER SUPPLY –

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Regulations 1992, Clause 3
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Provide polypropylene fusion welded joint system hot water supply pipes and branches to all fittings. Drain from HWC to be copper to drain to the outside of the building above ground over gardens or a gully trap. Installation shall be complete with seismic restraints and anti-scald device as per NZBC G12/AS1.

All hot water pipes to be insulated along with their length with 22mm wall thickness *Insultube* in roof space. The hot water pipe to the kitchen sink shall be insulated from the hot water heater to the sink (NZS4607:1989 601.2 & NZS4305:1996 3.7.2).

PIPE SUPPORTS –

Pipe and their supports shall be electrochemically compatible.

Except where anchor points are necessary, the pipes shall be supported in a way that permits free movement of the pipe along its length. Acceptable methods include lagging the pipe at the support with *Insultube*.

Support spacing

Above ground water supply shall be securely supported at centres of no greater than those in Table 7 of NZBC G12/AS1 7.0.

Movement in concrete or masonry

Pipes penetrating or installed in concrete or masonry wall or floors shall pass through a sleeve, to permit free movement for expansion and contraction.

Anchor points

Anchor points shall be provided where:

- a) Seal ring joints are used and
- b) The joint is not able to resist the thrust imposed by water pressure.

Protection from frosts

Water supply pipework shall be insulated where water is likely to become frozen, to appropriate levels for this frost prone area.

Comment

Locations where the water supply pipe work is likely to become frozen includes pipes concealed in exterior walls, ceiling spaces above ceiling insulation, or basements fixed to the outside of buildings.

SANITARY FITTINGS –

Allow to fix fittings as indicated on the plans for the following. Builder via the plumber to provide fittings. Carefully note dimensions and install where shown.

TAPS, FAUCETS AND VALVES –

Fix all taps, faucets and mixing valves, as supplied by the Builder via the plumber. Fix all other water supply fittings as necessary.

VENTS, SOIL STACKS –

To comply with NZBC G13/AS1 and G13/AS2

The above shall be PVC extended up through the roof and flashed with approved flashing material. Terminal vent is to be of an approved size to pass up exterior wall, through eave if required and through roof.

14. INTERNAL LININGS

- (a) All Walls (including wet areas) are sheeted with 10mm standard GIB plaster board
- (b) All ceilings are sheeted with 13mm GIB plaster board fixed to metal battens

To meet wind and earthquake loading some internal wall linings form bracing elements, alternatively they may form part of a fire rated wall system. In these instances, no product substitution is permitted.

15. INSULATION

- (a) Insulation to be **R2.6** Pink Batts to external perimeter walls (excluding garage) and internal garage-house wall/s, **R4.0** to ceilings excluding garage ceiling.

16. INTERNAL FINISHING TIMBER

- (a) Skirting to be 60 x 12mm MDF customwood bevel top and 60 x 12mm Pine to wet areas.
 (b) Door jambs to be MDF square dressed customwood.
 (c) Window reveals to be H3 treated pine.
 (d) Any other mouldings required are MDF custom-wood.

17. JOINERY

- (a) Seal all bench top-wall junctions to prevent moisture ingress as NZBC E3/AS1.
 (b) Food preparation surfaces and wall linings adjacent to appliances and facilities shall have surfaces that can be easily maintained in a hygienic condition.

18. PAINTING

Exterior timberwork (if applicable), excluding Linea weatherboards, to be clear oiled. B

INTERIOR

Area 1	Substrate	Condition
Walls including skirtings (Non Service Areas)	Paper faced plaster board	New
First Coat	Second Coat	Third Coat
Dulux Professional Acrylic Sealer Undercoat	Dulux Professional Low Sheen	Dulux Professional Low Sheen

Area 2	Substrate	Condition
Ceilings (Non Service Areas)	Paper faced plaster board	New
First Coat	Second Coat	Third Coat
Dulux Professional Acrylic Sealer Undercoat	Dulux Enviro2 Flat Sheen	Dulux Enviro2 Flat Sheen

Area 3	Substrate	Condition
Walls, Ceilings (Service Areas)	Paper faced plaster board	New
First Coat	Second Coat	Third Coat
Dulux Professional Acrylic Sealer Undercoat	Dulux Moldshield Low Sheen	Dulux Moldshield Low Sheen

Area 4	Substrate	Condition
Pine Mouldings including Doors	Timber	New
First Coat	Second Coat	Third Coat
Dulux Professional Acrylic Sealer Undercoat	Aqua Enamel Semi Sheen	Aqua Enamel Semi Sheen

Area 5	Substrate	Condition
MDF Areas	Timber	New
First Coat	Second Coat	Third Coat
Dulux Professional Acrylic Sealer Undercoat	Dulux Aqua Enamel Low Sheen	Dulux Aqua Enamel Low Sheen

EXTERIOR

Area 6	Substrate	Condition
--------	-----------	-----------

Eaves & Soffits	Fibre Cement Board	New
First Coat	Second Coat	Third Coat
Dulux Exterior Flat Acrylic	Dulux Exterior Flat Acrylic	Dulux Exterior Flat Acrylic

Area 7	Substrate	Condition
Axon Panel Areas	Concrete Fibre Board	New
First Coat	Second Coat	Third Coat
(Factory pre-coated)	Dulux X10 Low Sheen	Dulux X10 Low Sheen

This specification should be read in conjunction with the manufacturers recommendations contained in the relevant technical data sheets. All products are to be applied to manufacturer's specifications.

19. GAS SERVICE

- (a) Gas service is not included.

20. CERAMIC TILING

NOTE: Ensure upstands, wall junctions are sealed against moisture penetration as NZBC E3/AS1. Workmanship and installation to BRANZ Good Tiling Guide: Tiling

21. WATERPROOFING MEMBRANE

Tiled Bath Surround on Timber Framing

- (a) Selected tiles on waterproof membrane over 4.5mm Hardies board on H1.2 Timber framing.
- (b) Ardex Superflex WPM 001 or Mapei Mapegum WPS Waterproof Membrane with Ardex Deckweb to reinforce any junctions as required in the manufacturer's specification.
- (c) Selected tiles to be laid on tile adhesive over waterproof membrane to manufacturer's specification which must be compatible with the waterproof membrane manufacturer's specification.
- (d) All tiles to be finished with grout.

22. HEATING

- (a) Is not included

23. MISCELLANEOUS

- (a) Is not included

This specification is similar for all GJ Gardner Homes offices.

GJ Gardner Homes reserves the right to alter specifications without notice. In the event of a change in the GJ Gardner Homes system or pursuant to any building contract entered into by the parties, provided any such variation shall not materially disadvantage the owner and shall comply with New Zealand Standards and Codes.

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 Plans and specifications APPROVED in accordance
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ELECTRICAL SCHEDULE 150 - 200 sqm, 3 - 4 bedroom

BC171675

Consent Issued B0171675

Client:	James David Foote and Ruqiah Hannah Foote		
Builder:	G.J. Gardner Homes		
Address:	5 Catchpole Place, Two Roads, Woodend		
Date:	24/08/2017		
DESCRIPTION		NOTES	QTY
General (sockets, switches)			
2 way & intermediate switching	As per plan		1
Dimmer switches	Will only switch 300 watt in halogen		0
Single power socket which includes kitchen appliances	Includes kitchen connections i.e: microwave, fridge, waste, dishwasher, garage door openers & rangehood		8
Double power socket			19
Oven / Hob connection / Rangehood	Includes isolator		1
Water heater connection	Gas or electric		1
Switch plate colour			white
Metallic faceplates	Brushed stainless		Nil
Light fittings			
Down-lights	LED 13w		26
Vanity lights			2
Batten holder	100w lamp		2
Security lights	PDL twin spot		1
Mains / Services / Switchboard			
Internal Mains	Single phase 60amp		12m
Meter box	By G.J. Gardner		1
Switchboard	DBF 30 c/w rcd protection devices		1
Security			
Burglar alarm	3 sensor, 2 siren, 1 panic		Nil
Smoke detectors	Battery type c/w hush facility		2
Television / Phones / Data / Media			
Telephone outlet			3
TV outlet			2
Sky capable outlet			1
Terrestrial aerial & install	Gizmo UHF/VHF c/w mounting bracket		1
Fibre box			1
Heating / Ventilation			
Bathroom heater	Fan heater Goldair silver 2000 watt		2
Heated towel rail	5 bar ladder		2
Extract fan	150mm inline		2
Miscellaneous			
Weatherproof plug - double			1
Step lights	To hall way		3

NOTE: The quantities and content of this schedule are a guide only and may change due to individual requirements and house design at final electrical consultation.



Owners Initials



Builder Initials

SECTION 6

Technical Information

(Manufacturer's Information)

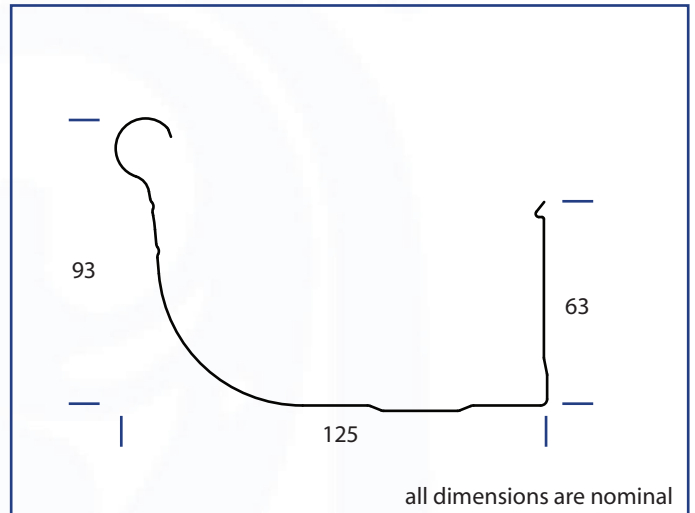
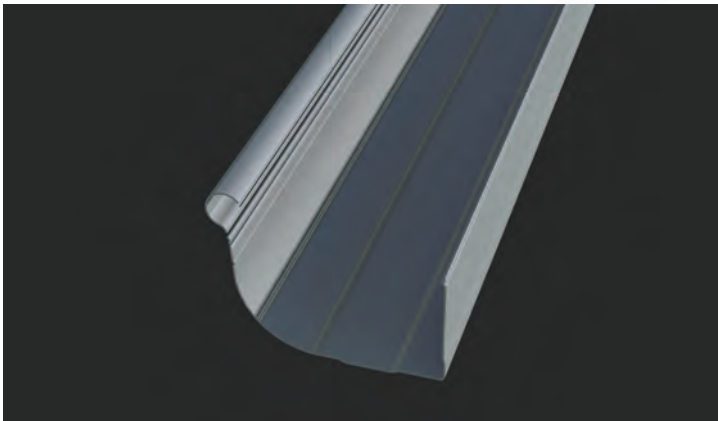
- ~~Septic Tank & Effluent Design incl. fencing~~
- ~~ECan Approval Documents~~
- ~~Gas Fire~~
- ~~Heating Unit~~
- ~~Solar Panels~~
- ~~Central Heating Systems~~
- A4 Details/Acceptable Solution Extract
- ~~Well/Water Test~~

Metalline Quad Gutter

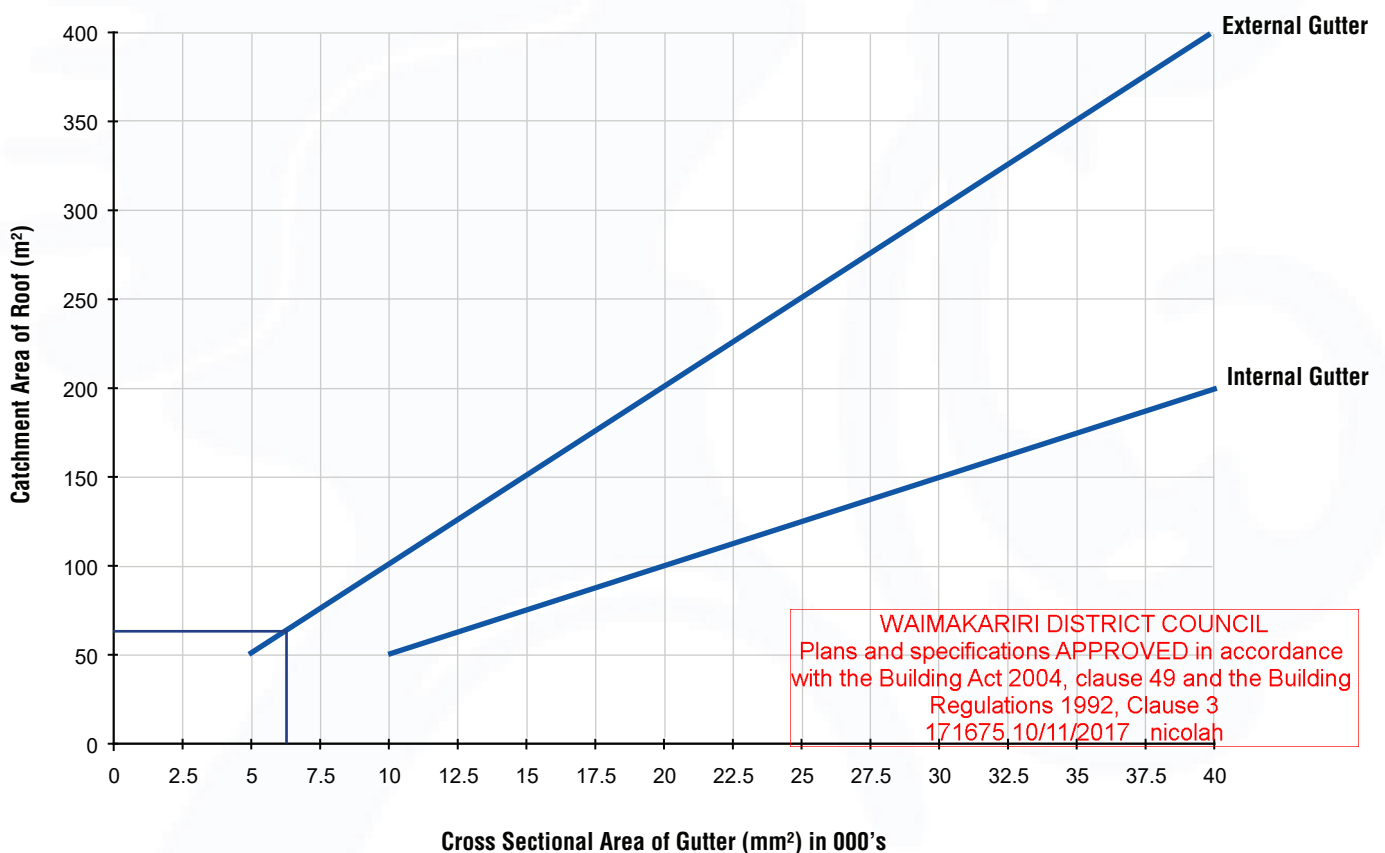
In Christchurch product is known as Colonial Quad Gutter

Metalline Quad Gutter is our most popular residential profile. Whether you are renovating or involved in a new build, this profile will enhance the appearance of your home. The Metalline system uses concealed brackets and is compatible with Metalcraft Metalline Fascia or timber fascia. Metalline Quad Gutter is available with overflow slots to prevent flooding from blockages, and snow straps are stocked to suit this profile if required. Metalline Quad Gutter is available in Zincalume, Galvsteel, Colorsteel Endura and Colorsteel Maxx.

Cross-sectional Area: 5550mm²



Catchment Area of Roof v Cross Sectional Area of Gutter



Note: The graph is based on a rainfall intensity of 100mm / hour and roof pitches less than 10 degrees.
 For more information on roof catchment areas and the effect of gutter cross sectional areas download the document on Roof Drainage

Manufacturing Locations Hamilton, Christchurch

Metalline Quad Gutter is available for purchase from all Metalcraft branch locations

www.metalcraft.net.nz

LEDLUX 13w

CIBA LED
DOWNLIGHT

0mm HCB and 0mm SCB
Zero clearance needed to materials

45mm DEEP 120mm WIDE
One of two LED's on
the market that can be safely
installed beneath trusses

IC RATED – FULLY INSULATE
Safe to cover AND abutt with Pink Batts

100mm Ø CUT OUT
Fits most old downlight holes
Great for renovations

155% BEAM ANGLE
Suitable for Raked Ceilings ≤30%

3000k WARM COLOUR TONE
Equivalent to a 100w Incandescent

**IP 44 = SAFE for SOFFIT and
SHOWER**
Protected against splashing water

FULLY DIMMABLE
Search LEDlux DIMMER #14381
Ideal for HPM or Clipsall Switch plates

Consent Issued BC171675



LEDLUX 13w

CIBA LED
DOWNLIGHT

5 YEAR WARRANTY
Includes labour costs to repair

LIGHTING PLANS
Hand drawn to 1:100 scale

FREE DELIVERY
on any House Lot order

ACCOUNT SERVICES
or pay over the phone with VISA

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Technical Data Sheet

FV130

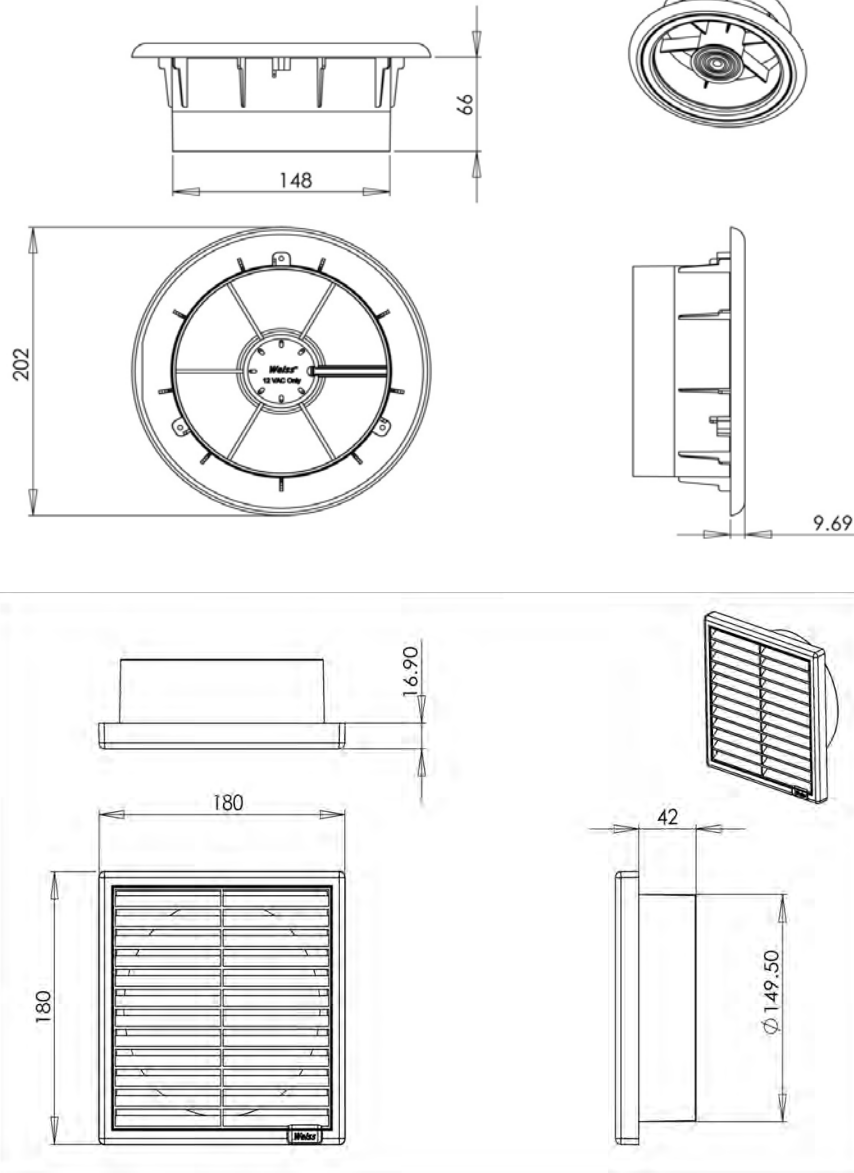
Shower Fan Unit

150mm ducting

Dimensions

Cut-out size for inlet fascia 170mm

Cut out size for outlet vent 155mm



Specifications

Weight	2kg
Colour of front fascia	White
Housing material	ABS

Approval

AS/NZS 3350.2.80:1998 Amdts 1-3 "Electrical Fan"

Features

- Easy to install
- 6 metres of 150mm ducting supplied
- Unique 'no fuss' all in one unit
- Allows moisture to be removed to the outside of your home
- All parts are included
- 3 year extended warranty

Technical Data Sheet

Product Use

The FV130 is used for the extraction of mist and steam

Typical applications:

- Bathrooms
- Toilets
- Laundries

Environmental Conditions

Operation	to IEC 721-3-3
Climatic conditions	class 3K5
Temperature	0...+50°C
Humidity	<95% r.h.

Standards

Test standards	AS/NZS 3350.2.80: 1998 Amdts 1-3 "Electrical Fan"
Test Report no	SD3190
EMC Compliance	This is a Level One product with an C frame motor that has a very low risk of causing EMC Interference

General

Free Air Fan Performance	362m³/ hr 100.6L/sec
Installed decibel rating	45DB

Ordering

When ordering please give name and type,	
Reference	FV130
Barcode	942000490093-8

Technical Data

Power Supply	230 VAC
Power consumption	max. 0.4 Amps
Supply Line fusing	max. 10A
For solid wires	2 x 1.5mm²
Motor	230-240VAC 50Hz 0.4 Amp
Motor insulation class	B1
Total motor wattage	40 Watts
Motor protection	Thermally protected
Total product wattage	40 watts

Thermakraft

THERMAKRAFT 215

BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY

APPLICATION AND INSTALLATION

Product Description	Thermakraft 215 BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY is specifically designed for use in Domestic and Commercial type buildings. Thermakraft 215 is a breathable, absorbent bituminous wall and roofing underlay. Thermakraft 215 will provide the following functions: <ul style="list-style-type: none">• Reduce wind entry into the cavity, thereby assisting the performance of thermal insulation.• Highly water vapour permeable, thereby allowing excess water vapour which might otherwise condense in the structure, to escape.• Provides a temporary protection against wind, dust, rain and other weathering elements until the external cladding is applied.		
Applications	Thermakraft 215 is suitable as a wall and roofing underlay where Fire Retardancy is NOT required, and with all cladding types. Thermakraft 215 is self-supporting to 1200mm rafter/purlin spacing. Thermakraft 215 can be used as an Air Barrier. Thermakraft 215 must not be left exposed to the elements for more than 7 days. Cladding on the same day is recommended. If Fire Retardancy (FI <5) is required, use Thermakraft CoverTek roof underlay		
Installation Roofing	Thermakraft 215 may be run unsupported vertically over purlins with a 150mm lap if roof pitch ≥8degrees. May be run vertically at pitches ≥3-8degrees if supported Fix securely to purlins with 8mm staples or 20mm clouts. The membrane should be firmly laid to avoid excessive dishing between purlins.		
Control of Condensation	Thermakraft 215 may be run horizontally across rafter/trusses with a 150mm lap, for roof pitches ≥3 degrees. Fix securely with 8mm staples or 20mm clouts. In climatic regions where condensation risks are high, such as cold or high humidity areas, care needs to be taken in specifying the correct design and installation to prevent moisture build-up in the roof cavities. Factors which adversely affect the condensation risk in roofing systems include; <ul style="list-style-type: none">• Humid, and/or cold climatic regions• Warm/Skillion roof construction• Low roof cavity air volume and restricted air movement• Omitting Vapour Control Layers• Ceiling penetrations and entry of warm air into roof cavities• Occupancy activities which have high moisture loading on conditioned spaces• Low pitched roof• Bulk insulation• Building structures ability to naturally dry Construction Moisture Skillion and Warm Roof Construction are particularly sensitive to moisture accumulation and the design and installation of roof construction needs to take into account the higher condensation risks. Refer MRM Code of Practice for details.		
Storage	Thermakraft 215 should be stored on end in dry conditions. Protect from the weather and direct sunlight.		
Roll Dimensions	1250mm x 40.0m = 50m ² 1250mm x 20.0m = 25m ²	20kg 10kg	WAIMAKARIRI DISTRICT COUNCIL Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3 171675 10/11/2017 nicolah

For more information regarding **Thermakraft COVERTEK₄₀₇ FIRE RETARDANT SELF SUPPORTING ABSORBENT BREATHABLE SYNTHETIC NON WOVEN ROOFING UNDERLAY** refer to the "DESIGNER and USER GUIDELINES" - Direct and Cavity Fix, or contact **Thermakraft Customer Services** on 0800 806 595.

THERMAKRAFT 215

BITUMINOUS
SELF SUPPORTING
ROOFING UNDERLAY

TECHNICAL SPECIFICATIONS

Technical Data

THERMAKRAFT 215 BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY complies with the requirements of NZBC E2/AS1 Table 23.

Nominal Grammage 400g/m²

NZBC E2/AS1 TABLE 23 AS A WALL UNDERLAY REQUIREMENTS

NZBC E2/AS1 TABLE 23 WALL UNDERLAY PROPERTIES	PROPERTY PERFORMANCE REQUIREMENTS	PROPERTY PERFORMANCE
Absorbency	≥100gsm	Pass
Vapour Resistance	≤7 MN.s/g	Pass
pH of Extract	≥6 and ≤9	Pass
Shrinkage	≤0.5%	Pass
Water Resistance	≥100mm	Pass
Air Barrier	≥0.1 MN.s/m ³	Pass
Duty		Heavy

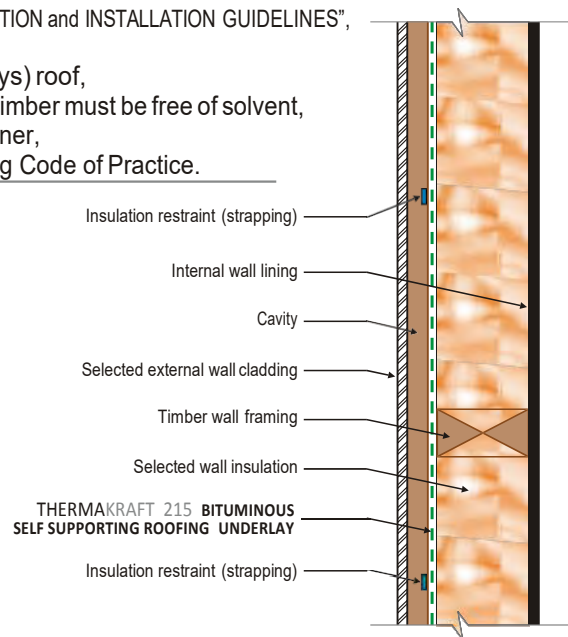
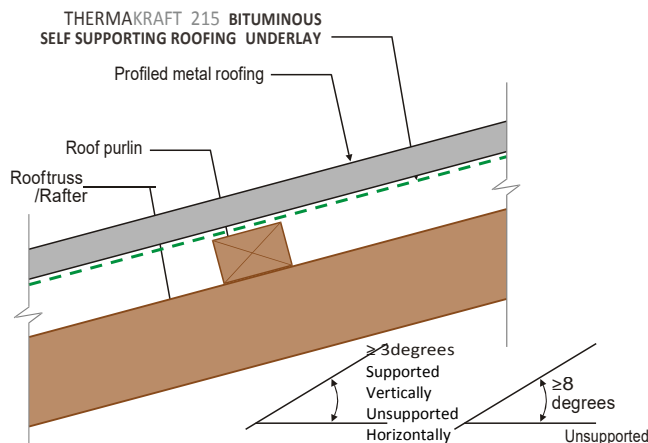
NZS2295:2006 Classification

Flammability Index		Non Fire Retardant
Wind Zone	R2	Up to Very High
NZS2295:2006 Classification	R2	Self Supporting

Durability/Limitations

For THERMAKRAFT 215 to meet the Performance Requirements of NZBC Clause B2, Durability B2.3.1(a) 50 years and B2.3.1(b) 15 years, E2 External Moisture, THERMAKRAFT 215:

- must be installed in accordance to the "APPLICATION and INSTALLATION GUIDELINES",
- run length no greater than 10 metres,
- is not left exposed for more than (7 days) roof,
- when used on LOSP treated timber, the timber must be free of solvent,
- installed by a licensed building practitioner,
- Installed in accordance with the Roofing Code of Practice.



The recommendations contained in Thermakraft's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to any conditions contained in the Warranty. All product dimensions and performance claims are subject to any variation caused by normal manufacturing process and tolerances. Furthermore, as the successful performance of the relevant system depends on numerous factors outside the control of Thermakraft (for example quality of workmanship and design), Thermakraft shall not be liable for the recommendations in that literature and the performance of the Product, including its suitability for any purpose or ability to satisfy the relevant provisions of the Building Code, regulations and standards.



Thermakraft
Industries (NZ) Ltd

11 Turin Place, East Tamaki, Auckland, New Zealand
PO Box 58-112, Botany, Manukau 2163, New Zealand
Phone: 09-273 3727 Fax: 09-273 3726 Free Phone: 0800 806 595
Email: sales@thermakraft.co.nz Website: www.thermakraft.co.nz



PRODUCT WARRANTY TEKTON® BUILDING WRAP

Marshall Innovations Limited (**Marshalls**) warrants, subject to the conditions set out below, that Tekton® Building Wrap will:

- Be free from defects due to defective workmanship or materials; and
- Meet the specifications in the Tekton® Building Wrap BRANZ appraisal No. 548 for a period of 50 years from the date of purchase.

Conditions of Warranty

This product warranty will be void and inapplicable if:

1. The product is not installed, used and maintained in a residential home or building designed and constructed to meet the New Zealand Building Code.
2. The product is not installed, used and maintained in accordance with installation, use and maintenance information contained in:
 - the Tekton Product Specification published on Marshalls' website (mwnz.com); and
 - BRANZ appraisal No. 548 published on Marshalls' website (mwnz.com).
3. The person claiming for breach of warranty (**claimant**) does not make a written claim:
 - if the defect was reasonably apparent prior to installation, prior to installation; or
 - if the defect was not reasonably apparent prior to installation, within 30 days after the defect became, or should have become, reasonably apparent.
4. The claimant does not provide proof of purchase and such details of installation (including date of installation and name of installer) as reasonably required by Marshalls.

Limitation of liability

The claimant's sole remedy for breach of this product warranty is, at Marshall's option, for Marshalls to supply replacement product, to repair the affected product, to pay the cost of replacing the affected product or to refund the cost of the products.

Notwithstanding any other provision of this product warranty, Marshalls will not be liable for indirect or consequential loss, special damages, economic loss or loss of profit, whether arising in contract or tort. In particular, Marshalls will not be liable for any claims, damages or defects arising from or attributable to poor workmanship, poor design or detailing, settlement or structural movement, normal wear and tear, or growth of mould, mildew, bacteria or any organism on any product.

This warranty may be transferred to each subsequent owner of the building in which the product is installed or used, provided that each subsequent owner must be notified in writing of, and at all times be subject to, these conditions of warranty. An owner will have no rights under this warranty following any such transfer.

Nothing in this product warranty excludes or modifies any legal rights an owner may have under the Consumer Guarantees Act or otherwise which cannot be excluded or modified by law. All warranties, liabilities and obligations, except as expressly set out in this product warranty, are excluded to the fullest extent permitted by law.



BRANZ Appraised

Appraisal No. 548 [2013]

TEKTON® BUILDING WRAP

Appraisal No. 548 [2013]

This Appraisal replaces BRANZ Appraisal No. 548 [2007], issued 27 July 2007.

Amended 17 December 2013.



BRANZ Appraisals

Technical Assessments of products for building and construction.



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Product

- 1.1 Tekton® Building Wrap is a synthetic breather-type flexible wall underlay and air barrier for use under direct and non-direct fixed wall cladding on timber and steel framed buildings. The product is manufactured of a coated spun-bonded polypropylene.

Scope

- 2.1 Tekton® Building Wrap has been appraised for use as a flexible wall underlay on timber framed buildings within the following scope:
- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with absorbent wall claddings directly fixed to framing; and,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
 - with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1; and,
 - situated in NZS 3604 Wind Zones up to, and including Very High.
- 2.2 Tekton® Building Wrap has been appraised for use as a flexible wall underlay on steel framed buildings within the following scope:
- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
 - with masonry veneer subject to specific design; and,
 - situated in NZS 3604 Wind Zones up to, and including Very High.
- 2.3 Tekton® Building Wrap has been appraised for use as a flexible wall underlay over rigid wall underlays on timber and steel framed buildings within the following scope:
- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - with absorbent and non-absorbent wall claddings installed over an 18 mm minimum drained cavity; and,
 - with masonry veneer in accordance with NZBC Acceptable Solution E2/AS1 for timber framed buildings or specific design for steel framed buildings; and,
 - situated in NZS 3604 Wind Zones up to and including Extra High.
- 2.4 Tekton® Building Wrap has also been appraised for use on buildings subject to specific weathertightness design. Building designers are responsible for the building design and for the incorporation of Tekton® Building Wrap into their design in accordance with the declared properties and the instructions of Marshall Innovations Limited.

Building Regulations

New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, Tekton® Building Wrap, 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, B2.3.1 (b), 15 years and B2.3.2. Tekton® Building Wrap meets these requirements. See Paragraphs 9.1 and 9.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. When used as part of the cladding system, Tekton® Building Wrap will contribute to meeting this requirement. See Paragraphs 12.1 – 12.3.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Tekton® Building Wrap meets this requirement and will not present a health hazard to people.

- 3.2 This is an Appraisal of an **Alternative Solution** in terms of the New Zealand Building Code compliance.

Technical Specification

- 4.1 Tekton® Building Wrap is a 100 g/m² light grey sheet polypropylene membrane material approximately 0.6 mm thick.
- 4.2 The product is supplied in rolls 1.370 m x 74 m and 2.743 m x 37 m. The product is printed with the Tekton® logo repeated along the length of the roll. The rolls are wrapped with an instruction sticker.

Accessories

- 4.3 Accessories used with Tekton® Building Wrap which are supplied by the installer are:
- Fixings – staples, clouts, screws or proprietary wrap fixings, or other temporary fixings to attach the wall wrap to the framing.
 - Wall underlay support – polypropylene strap, 75 mm galvanised mesh or galvanised wire, or vertical cavity battens where required to support the wall wrap in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.

Handling and Storage

- 5.1 Handling and storage of the product, whether on or off site, is under the control of the installer. The rolls must be protected from damage and weather. They must be stored on end, under cover, in clean, dry conditions and must not be crushed.

Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Tekton® Building Wrap. 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

Timber and Steel Framing

- 7.1 Studs must be provided at maximum 600 mm centres. Dwarfs must be fitted flush between the studs at maximum 1200 mm centres.

General

- 7.2 Tekton® Building Wrap is intended for use as an alternative to conventional building papers which are fixed over timber and steel framed walls in order to limit the entry of wind into building cavities, and to act as a secondary barrier to wind-driven rain.

- 7.3 The material also provides a degree of temporary weather protection during early construction. However, the product will not make the building weathertight and some wetting of the underlying structure is always possible before the building is closed in. Hence, the building must be closed-in and made weatherproof before moisture sensitive materials such as wall or ceiling linings and insulation materials are installed.
- 7.4 Tekton® Building Wrap must not be exposed to the weather or ultra violet light for a total of more than 60 days before being covered by the wall cladding.
- 7.5 Tekton® Building Wrap is suitable for use under wall claddings as a wall underlay as called up in NZBC Acceptable Solution E2/AS1, Table 23, except that it must not be used with non-absorbent wall claddings such as vinyl or metal based sidings or weatherboards in direct fixed installations. Tekton® is suitable for use under cavity based wall claddings as a non-absorbent synthetic wall underlay as called up in NZS 2295, Table 2.4 on steel framed buildings. Refer to Table 1.
- 7.6 Tekton® Building Wrap is also suitable for use as an air barrier to walls that are not lined, such as attic spaces at gable ends, as called up in NZBC Acceptable Solution E2/AS1, Paragraph 9.1.4 [c]. Refer to Table 1.

Table 1: NZBC E2/AS1 Table 23 Requirements

NZBC E2/AS1 Table 23 Wall Wrap Properties	Property Performance Requirement	Actual Property Performance
Absorbency	$\geq 100 \text{ g/m}^2$	Classified as non-absorbent [see paragraph 7.4]
Vapour Resistance	$\leq 7 \text{ MN s/g}$	Pass
Water Resistance	$\geq 20 \text{ mm}$	Pass
pH of Extract	≥ 5.5 and ≤ 8	9.78 [Note 1]
Shrinkage	$\leq 0.5\%$	Pass
Mechanical	Edge tear and tensile strength	Edge tear: Machine direction = 228 N Cross direction = 186 N Tensile strength: Machine direction = 4.4 kN/m Cross direction = 3.9 kN/m
Air Barrier	Air resistance: $\geq 0.1 \text{ MN s/m}^3$	Pass

Note 1: Further testing of Tekton® Building Wrap was completed to determine the effect of the high pH level on the wall underlay and materials it is likely to come into contact with during its serviceable life. The testing confirmed that the high pH had no adverse effects on the wall underlay performance, or the performance of other materials.

- 7.7 In cavity installations where the cavity battens are installed at greater than 450 mm centres, the wall underlay must be supported between the battens to prevent the wall underlay bulging into the cavity space when bulk insulation is installed in the wall frame cavity in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.5.

Stucco Plaster

- 7.8 Tekton® Building Wrap is suitable for use as a non-rigid backing material for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.5.1. The wall underlay must be supported with 75 mm galvanised mesh or plastic tape or wire at 150 mm centres run across the cavity battens to limit deflection to a maximum of 5 mm in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.5.2.
- 7.9 Tekton® Building Wrap may also be used as a slip layer over rigid backings for stucco plaster in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.3.3 [b].

Structure

- 8.1 Tekton® Building Wrap is suitable for use in all Wind Zones of NZS 3604 up to, and including, Very High when used as a flexible building underlay, and all Wind Zones of NZS 3604 up to, and including, Extra High when used as an overlay for rigid building underlays.

Durability

- 9.1 Tekton® Building Wrap meets code compliance with NZBC Clause B2.3.1 [a], not less than 50 years for building wraps used where the cladding durability requirement or expected serviceable life is not less than 50 years, and code compliance with NZBC Clause B2.3.1 [b], 15 years for building wraps used where the cladding durability requirement is 15 years.

Serviceable Life

- 9.2 Provided it is not exposed to the weather or ultra-violet light for a total of more than 60 days, and provided the exterior cladding is maintained in accordance with the cladding manufacturer's instructions and the cladding remains weather resistant, Tekton® Building Wrap is expected to have a serviceable life equal to that of the cladding.

Control of Internal Fire and Smoke Spread

- 10.1 Tekton® Building Wrap has an AS 1530 Part 2 flammability index of not greater than 5 and therefore meets the requirements of NZBC Acceptable Solutions C/AS2 to C/AS6, Paragraph 4.17.8 b), for the surface finish requirements of suspended flexible fabric used as an underlay to exterior cladding that is exposed to view in occupied spaces. It may therefore be used with no restrictions in all buildings.

Prevention of Fire Occurring

- 11.1 Separation or protection must be provided to Tekton® Building Wrap from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 – C/AS6 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

- 12.1 Tekton® Building Wrap must be used behind claddings that meet the requirements of the NZBC, e.g. such as those covered by NZBC Acceptable Solution E2/AS1, or claddings covered by a valid BRANZ Appraisal.
- 12.2 Tekton® Building Wrap, when installed in accordance with the Technical Literature and this Appraisal, will assist in the total cladding systems compliance with NZBC Clause E2.
- 12.3 When used as an air barrier, particular care must be taken to ensure an air tight barrier is achieved, and weather sealing at all openings and penetrations through the cladding meets the requirements of the NZBC.

Installation Information

Installation Skill Level Requirements

- 13.1 Installation must always be carried out in accordance with the Technical Literature and this Appraisal, by competent tradespersons with an understanding of wall wrap installation.

Wrap Installation

- 14.1 Tekton® Building Wrap must be fixed to all framing members at maximum 300 mm centres with hot-dip galvanised, large-head clouts 20 mm long, zinc plated 6–8 mm staples, self-drilling screws, or proprietary wrap fixings. The membrane must be pulled taut over the framing before fixing.
- 14.2 Tekton® Building Wrap must be run horizontally and must extend from the upper-side of the top plate to the under-side of the bearers or wall plates supporting ground floor joists, or below bottom plates on concrete slabs. Horizontal laps 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 membrane. End laps must be made over framing and be no less than 150 mm wide.
- 14.3 The wall underlay should be run over openings and these left covered until windows and doors are ready to be installed. Openings are formed in the membrane by cutting on a 45 degree diagonal from each corner of the penetration. The flaps of the cut membrane must be folded inside the opening and stapled to the penetration framing. Excess wall underlay may be cut off flush with the internal face of the wall frame.
- 14.4 Tekton® Building Wrap can be added as a second layer over head flashings in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.10.3.
- 14.5 When fixing the product in windy conditions, care must be taken due to the large sail area created by wide roll widths.
- 14.6 Any damaged areas of Tekton® Building Wrap, such as tears, holes or gaps around service penetrations, must be repaired. Damaged areas can be repaired by covering with new material lapping the damaged area by at least 150 mm and taping, or by taping small tears.

Inspections

- 14.7 The Technical Literature must be referred to during the inspection of Tekton® Building Wrap installations.

Basis of Appraisal

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

Tests

- 15.1 The following tests have been carried out on Tekton® Building Wrap by Scion: Folding strength of paper in accordance with AS/NZS 1301.423; edge tear resistance and tensile strength in accordance with AS/NZS 4200.1 and air resistance in accordance with BS 6538-3.
- 15.2 The following tests have been carried out on Tekton® Building Wrap by BRANZ: Absorbency in accordance with AS/NZS 4201.6, Vapour transmission in accordance with ASTM E 96B, Shrinkage in accordance with AS/NZS 4201.3, Water barrier in accordance with AS/NZS 4201.4 and pH of extract in accordance with AS/NZS 1301.421. A range of these tests were completed before and after Tekton® Building Wrap was exposed to ultra-violet light.
- 15.3 The Flammability Index of Tekton® Building Wrap has been evaluated in accordance with AS 1530.2.

Other Investigations

- 16.1 A durability opinion was given by BRANZ technical experts.
- 16.2 Site inspections were carried out by BRANZ to assess methods used for the installation of Tekton® Building Wrap, and to examine completed installations.
- 16.3 The marketer's Technical Literature, including installation instructions, have been examined by BRANZ and found to be satisfactory.

Quality

- 17.1 The manufacture of Tekton® Building Wrap has not been examined by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory. BRANZ has taken note of product certification by ICC-ES and CCMC covering quality aspects associated with the product.
- 17.2 The quality of supply to the market is the responsibility of Marshall Innovations Limited.
- 17.3 Building designers are responsible for the design of the building, and for the incorporation of the wall wrap into their design in accordance with the instructions of Marshall Innovations Limited.
- 17.4 Quality of installation is the responsibility of the installer in accordance with the instructions of Marshall Innovations Limited.

Sources of Information

- AS 1530.2 – 1993 Test for flammability of materials.
- AS/NZS 1301.421s: 1998 Determination of the pH value of aqueous extracts of paper, board and pulp – cold extraction method.
- AS/NZS 4200.1: 1994 Pliable building membranes and underlays – materials.
- AS/NZS 4201.1: 1994 Pliable building membranes and underlays – Methods of test – Resistance to dry delamination.
- AS/NZS 4201.2: 1994 Pliable building membranes and underlays – Methods of test – Resistance to wet delamination.
- AS/NZS 4201.3: 1994 Pliable building membranes and underlays – Methods of test – Shrinkage.
- AS/NZS 4201.4: 1994 Pliable building membranes and underlays – Methods of test – Resistance to water penetration.
- AS/NZS 4201.6: 1994 Pliable building membranes and underlays – Methods of test – Surface water absorbency.
- BS 6538.3: 1987 Method for determination of air permeance using the Garley apparatus.
- NZS 2295: 2006 Pliable, Permeable Building Underlays.
- NZS 3604: 2011 Timber-framed buildings.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005 [Amendment 5, 1 August 2011].
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.

Amendment

Amendment No. 1, dated 17 December 2013.

This Appraisal has been amended to fix an editorial error.



In the opinion of BRANZ, **Tekton® Building Wrap** 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 **Marshall Innovations 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. **Marshall Innovations 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 **Marshall Innovations 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 **Marshall Innovations Limited** or any third party.

For BRANZ



Cheydra Percy

Chief Executive

Date of Issue:

16 December 2013

Dektite Aluminium

Consent Issued BC171675

BC171675

The best solution for stone chip and pressed metal tiles

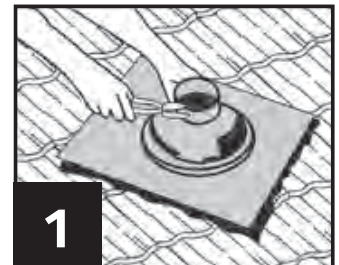
- ✓ The base is 99.9% pure grade aluminium making it strong, malleable and easy to install.
- ✓ Environmentally friendly, ideal where potable water is collected.
- ✓ The best solution for stone chip and pressed metal tiles.
- ✓ EPDM withstands temperatures from -50°C - 115°C and up to 150°C intermittently.

Code	Base (mm)	Pipe (mm)	Pitch	Colour
TFA 12-70	500 x 600	12-70	0-45°	BLACK (EPDM)
TFA 50-170	600 x 600	50-170	0-45°	
TFA 110-220	764 x 764	110-200	0-45°	
TFA 160-300	764 x 764	160-300	0-45°	
TFA 300-450	965 x 965	300-450	0-45°	

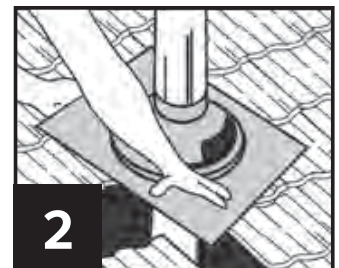


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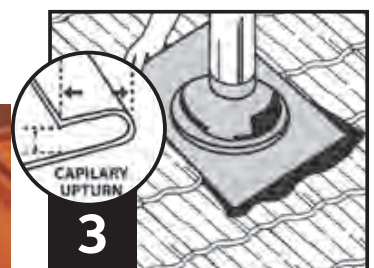
Installation Instructions:



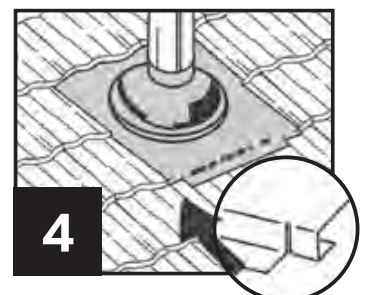
Trim Dektite cone to suit pipe size using sharp tin snips.



After lubricating the flue with water, slide Dektite down to the tile level.



Form an anti-capillary fold then place upper edge of base under up-stream tiles.

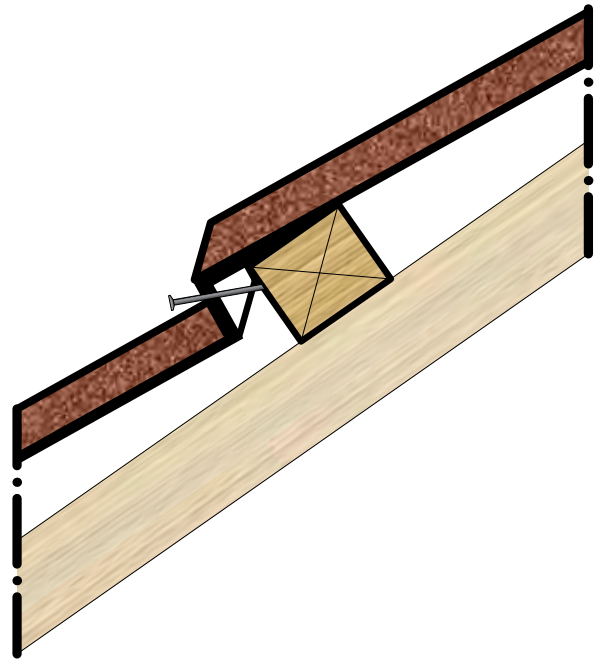


Dress base to profile, cut tabs on the bottom corners and fold under to stop wind lift.

Tiles are secured to the battens by nailing through the nose of the upper tiles and through the back up stand of the lower tile into the side of the battens. The positioning of the nails and the number of nails per tile are determined by the type and length of the tile (refer to pages 23-28; NAIL POSITIONING). The tiles should be fastened two courses above the tiles that are being laid.

Apply weight when nailing. The person nailing should stand on tile being installed facing the eaves.

Gun nailers can also be used to securely fasten the tiles.

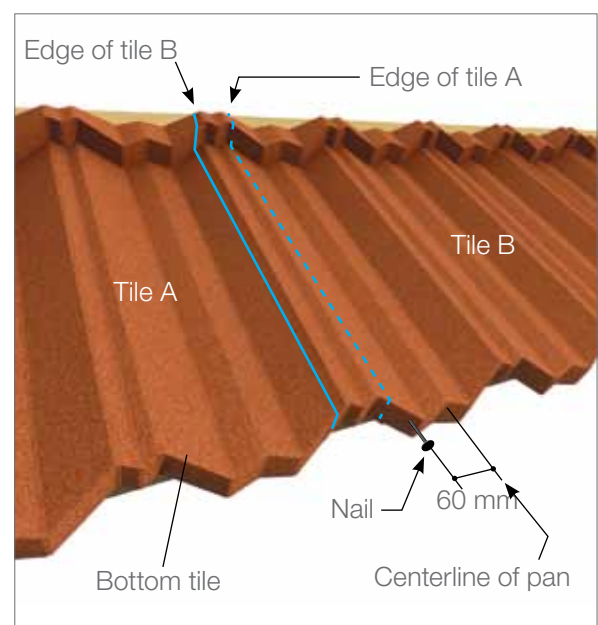
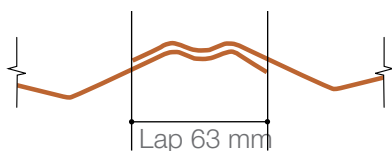
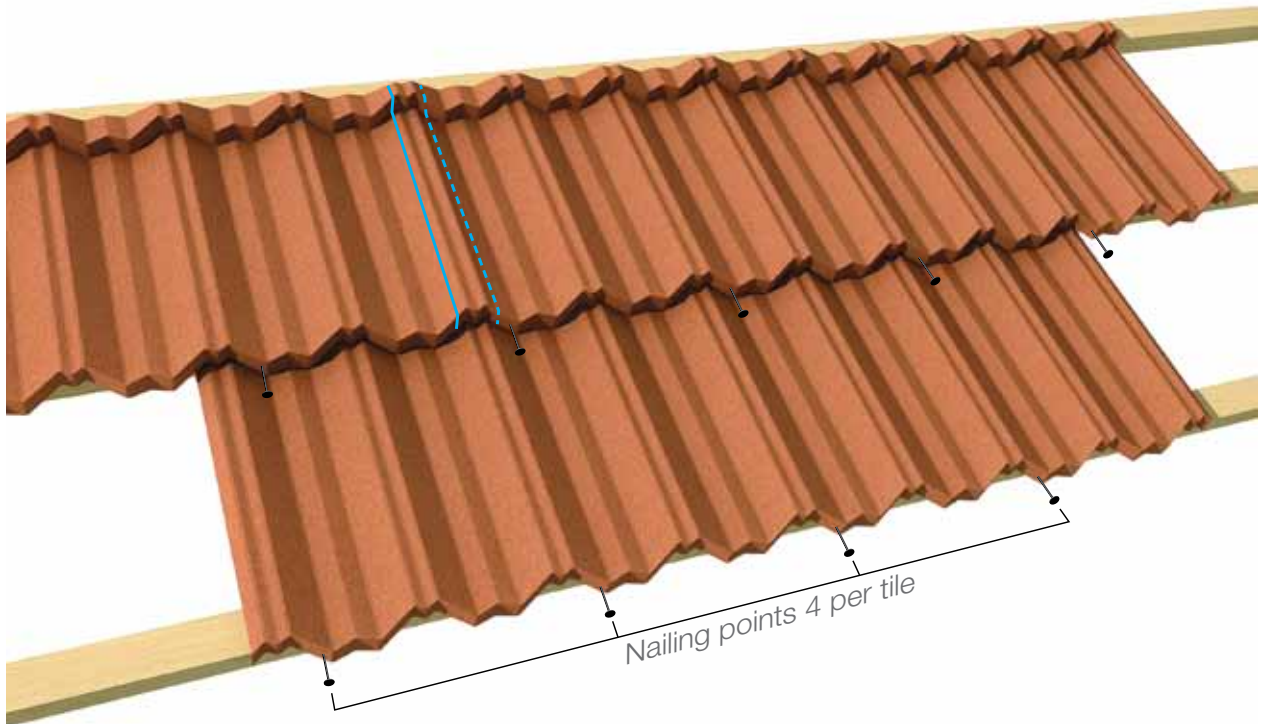


The correct positions for nailing different profiles are shown below. Correct nailing ensures good holding of the tile and ample penetration of the nail, at the same time restricting nail penetration to a maximum of two thicknesses.

NOTE: In areas prone to extremely strong winds, installation must meet the local standards and by-laws and nailing should be at 7 points per tile (8 points per Classic tile).

CLASSIC TILES

Nails should be approximately 60 mm to the side of the centre of the pan of the tile and close to the bottom of the downturned flange.



Technical Note

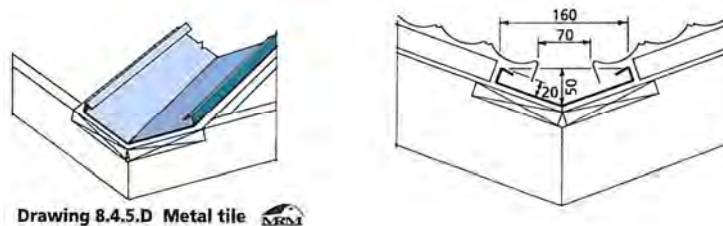
Valley Design

Gerard Roofs Combination Valleys are designed to meet the requirements for roof drainage on catchment areas that feed into the valley as indicated in the NZ Metal Roof and Wall Cladding Code of Practice (MRM Code of Practice).

The capacity of a valley gutter is determined in a different manner than that for normal gutters that are flat or very near to flat. By definition a valley is a gutter at the internal intersection of two sloping planes of roof cladding where the roof pitch is greater than 8° . Because the minimum slope of a valley is greater than 5.5° the discharge rate is greater than that of a flat gutter and as the roof pitch increases, the rate of flow, and therefore the catchment area that can be drained, increases proportionately.

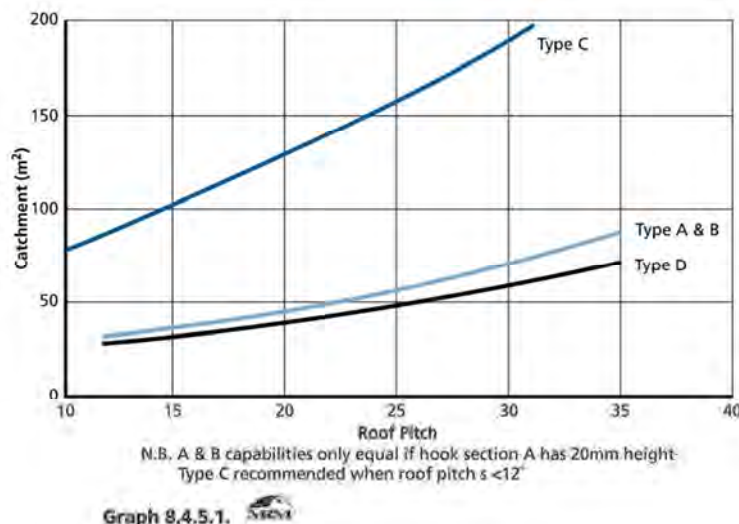
Valley gutters must be designed for the greatest rainfall likely in the area in a 50 year return period (ARI). The valley capacity must be capable of discharging the total roof catchment area above the valley plus half the area of any dormer.

Figure 1 - MRM Code of Practice Valley Dimensions



Gerard Roofs Combination Valley dimensions are very similar to those in the MRM Code of Practice shown as drawing 8.4.5.D (Figure 1)

Figure 2 - Roof Pitch vs Catchment Area for Different Valley Types



A Gerard Roofs Combination Valley is specifically designed based on the information supplied in the MRM Code of Practice and in use history by Gerard Roofs. It can be used for catchment areas that do not exceed the line of Valley Type D for the pitch shown on Graph 8.4.5.1. (Figure 2).

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Technical Note

E2/AS1 requires a valley to be 250 mm wide or 160 mm wide as being suitable for a catchment area of up to 16 m² for roof pitches down to 12.5°. The catchment area of 16 m² for a pitch of 12.5° aligns with MRM graph 8.4.5.1, however beyond 12.5° it does not take into account the flow rates and increase in catchment area that the valley can cope with.

MAPEI NZ Ltd Mapegum WPS

Product Technical Statement: 104353

miproducts
THE NATIONAL PRODUCT DATABASE

A fast drying, flexible liquid membrane for internal waterproofing

[View miproducts listing](#)

MEDIUM

Level of assurance needed to demonstrate NZ Building Code Compliance*Supporting documentation should include technical information by manufacturer and either an independent assessment or reference to an industry-based scheme*MAPEI NZ Ltd confirms that this minimum level of assurance has been met or exceeded by the following:
BRANZ Appraisal
[484 \(2012\)](#)**Product Description**

Mapegum WPS is a ready-to-use, solvent-free, one-component, grey-coloured paste with a base of synthetic resins in water dispersion. Mapegum WPS has a thixotropic consistency which makes it easy to apply on horizontal, sloping and vertical surfaces. After rapid evaporation of the water content, Mapegum WPS forms a flexible membrane which is not sticky and which is strong enough to withstand light pedestrian traffic. It also forms an excellent surface which bonds perfectly to adhesives used for laying ceramics, marble and natural stone.

Design Guidelines

WHERE TO USE - Waterproofing indoor floor and wall surfaces that are not subject to rising damp. Flexible, anti-fracture membrane. Apply before the installation of ceramic tiles or stone material.

Waterproofing walls and floors in bathrooms and shower cubicles before laying ceramic tiles, natural stone and mosaic.

Waterproofing kitchen walls and floors and work tops before laying ceramic tiles and natural stone.

Mapegum WPS may be used on the following:

- I plasterboard, gypsum or cementitious render, lightweight cement block and marine-plywood;
- I cementitious, anhydrite, wooden and magnesite substrates and existing ceramic and natural stone

Environmental

Product certified EC1 Plus by the GEV Institute (Gemeinschaft Emissions-kontrollierte Verlegewerkstoffe e.V) as a product with very low emission of volatile organic compounds.

**MSDS** [View Material Safety Data Sheet](#)**Quality Assurance**

ISO 9001 (Quality Management)

Member of New Zealand Green Building Council

ISO 14001:2004 Cert No: 1230

ISO 18001:2007 Cert No: 3586

EMAS IT:000019

**masterspec partner****Company Contact Details**

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Technical Statement

Scope

Mapegum WPS Wet Area Membrane is for use in buildings where an impervious waterproof membrane is required to floors and walls to prevent damage to building elements and adjoining areas.

Mapegum WPS is designed to be used where a quicker curing time is required, such as in cool or humid conditions.

The membrane must be protected from physical damage by the application of ceramic or stone tile finishes.

New Zealand Building Code (NZBC)

The product will, if employed in accordance with the supplier's installation and maintenance requirements, assist with meeting the following provisions of the building code:

- | **Clause B2 Durability:** Performance B2.3.1, B2.3.2
- | **Clause E3 Internal moisture:** Performance E3.3.6
- | **Clause F2 Hazardous building materials:** Performance F2.3.1

Notes

Clause B2 DURABILITY: Performance B2.3.1 (b) 15 years and B2.3.2. Mapegum WPS Wet Area Membranes meet these requirements. See Paragraph 9.1.

Evidence

The product meets the requirements set out in the following documents, or relevant parts of cited standards within the documents:

Mapegum WPS Wet Area Membrane if designed, used, installed and maintained in accordance with the MAPEI technical data sheets will meet the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 (b) 15 years and B2.3.2. Mapegum WPS Wet Area Membrane meet these requirements. See Paragraph 9.1.

Clause E3 INTERNAL MOISTURE: Performance E3.3.6. Interior wet area floors and walls incorporating Mapegum WPS Wet Area Membranes will meet this requirement. See Paragraphs 11.1 - 11.7.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Mapegum WPS Wet Area Membrane meet this requirement and will not present a health hazard to people.

Supporting Evidence

The product has and can make available the following additional evidence to support the above statements:



BRANZ Appraisal
[484 \(2012\)](#)

Special Conditions

Installation requirements

Installation of the membranes must be completed by trained applicators, approved by MAPEI New Zealand Ltd

Installation of substrates must be completed by trades persons with an understanding of internal wet area construction, in accordance with instructions given within the MAPEI New Zealand Ltd Technical Literature.

Substrates must be dry, clean and stable before installation commences. Surfaces must be smooth and free from nibs, sharp edges, dust, dirt or other materials such as oil, grease or concrete form work release agents.

The relative humidity of the concrete must be 75% or less before membrane application. All voids, cracks, holes, joints and excessively rough areas must be filled to achieve an even and uniform surface. Junctions of substrate abutments, such as at wall/floor and wall/ wall junctions must have a reinforcement installed as set out in the Technical Literature.

Substrates must be primed with suitable primer and allowed to cure before the Mapegum WPS is installed

Special requirements

Installation must not be undertaken where the substrate surface temperature is below 10°C or above 35°C.

Mapegum WPS must be thoroughly stirred before application with a slow speed mechanical mixer.

The membrane must be applied in a minimum of two coats at the rates set out in the Technical Literature. Subsequent coats must be applied in an opposite direction to the previous coat.

The total finished system thickness of the Mapegum WPS must be a minimum of 1.0 mm.

Reinforcement fabric or Mapeband PE 120 is bedded into the wet layer between coats to provide movement protection at wall/ wall and wall/floor junctions, or any other areas such as joints in the flooring substrate, floor cracks, or around penetrations in the membrane. In all other situations, reinforcement provisions as set out in this Appraisal and the Technical Literature apply.

Maintenance requirements

No maintenance of the membranes will be required provided significant substrate movement does not occur and the tile finish remains intact.

Regular checks must be made of the tiled areas to ensure they are sound and will not allow moisture to penetrate. Any cracks or damage must be repaired immediately by repairing the tiles, grouts and sealants.

In the event of damage to the membranes, the tiling must be removed and the membrane repaired by removing the damaged portion and applying a patch as for new work.

Drainage outlets must be maintained to operate effectively, and ceramic or stone tile finishes must be kept clean.



Date last validated: **29 April 2014**



Date last updated: **29 April 2014**

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ARDEX WPM 001

Superflex Bathroom & Balcony Premixed - 1 Part

Single Component Undertile Waterproofing Membrane

BRANZ Appraised

Low VOC content – meets Green Building Council of Australia Green Star IEQ-13 requirements

Fast drying one part acrylic membrane

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
171675 10/11/2017 nicolah

DISCLAIMER The technical details, recommendations and other information contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is your responsibility to ensure that our products are used and handled correctly and in accordance with any applicable New Zealand Standard, our instructions and recommendations and only for the uses they are intended. We also reserve the right to update information without prior notice to you to reflect our ongoing research and development program. Country specific recommendations, depending on local standards, codes of practice, building regulations or industry guidelines, may effect specific installation recommendations. The supply of our products and services is also subject to certain terms, warranties and exclusions, which may have already been disclosed to you in prior dealings or are otherwise available to you on request. You should make yourself familiar with them.

Superflex Bathroom & Balcony Premixed - 1 Part Undertile Waterproofing Membrane



PRODUCT DESCRIPTION

Ardex WPM 001 (Superflex Bathroom & Balcony Premixed 1 Part) is a tough, ready to use waterproofing membrane specifically designed for use under tiles. Ardex WPM 001 has been uniquely formulated with synthetic microfibres to increase its strength and eliminate the need for a separate reinforcement mat. Ardex WPM 001 is based on the most advanced acrylic polymer technology, and is totally resistant to re-emulsification once cured.

Ardex WPM 001 is flexible, safe to use, low in odour, and is fully compatible with polymer modified tile adhesives. Ardex WPM 001 is one of the fastest drying one part acrylic membranes on the market – normally ready to tile in 48 hours @ 23°C.

Ardex WPM 001 meets the Green Building Council of Australia Green Star IEQ-13 requirements for Architectural Sealant when tested in accordance with SCAQMD Method 304-91 Determination of Volatile Organic Compounds (VOC) in Various Materials as referenced by South Coast Air Quality Management Division (SCAQMD) Rule 1168.

FEATURES/BENEFITS

- Fast drying Ardex WPM 001 can be tiled over in 48 hours in non critical areas*
- Liquid reinforced: Excellent strength, eliminates need for reinforcing mat
- Flexible: Accommodates normal building movement class 3 membrane as per AS/NZ 4858: 2004 Wet Area Membranes
- Advanced acrylic: Will not re-emulsify once cured
- Designed for tiling - Fully compatible with Ardex tile adhesive systems
- Water based, safe to use, low odour & easy cleaning
- CSIRO Appraisal #91 for undertile waterproofing in shower recesses
- Conforms to the requirements of AS/NZ 4858: 2004 Wet Area Membranes. (Ref: CSIRO Report 3779)

*Critical areas include areas where the membrane is applied at greater than 0.5mm or over impermeable substances such as over bond breakers or incorporating other reinforcement. Longer drying times are necessary in these areas.

APPLICATION RANGE

Performance Levels

Commercial and residential

Location

Internal wet areas, balconies, decks, and other areas that will be tiled or otherwise protected from regular foot traffic.

Surfaces

Walls & floors

Substrates

Concrete	Cured for min. 28 days or sealed when set with one coat of Ardex WPM 300 (HydrEpoxy 300) at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. External wet concrete should be allowed to dry thoroughly or sealed with one coat of Ardex WPM 300 as above.
Renders and screeds	Cured for min. 7 days or sealed when set with one coat of Ardex WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. Wet render should be allowed to dry thoroughly or sealed with one coat of Ardex WPM 300 as above.
Fibre cement	Suitable for wet area grade fibre cement.
Plasterboard	Wet area grade only.
Plywood	Structural plywood (PAA branded), marine grade or other wet area grade only.
Particleboard	Wet area grade, internal use only (special preparation is required – contact Ardex).
Permanent Immersion	In conditions of permanent immersion, it is recommended that Ardex WPM 002 (Superflex Two Part) is used. Must be covered with tiles for full immersion.
Contact Ardex for use over existing membranes, covering materials, and any other substrates not listed.	

SPECIFICATION CLAUSE

ARDEX WPM 001 (Superflex Premixed)

The waterproofing membrane shall be Ardex WPM 001: a one part acrylic modified fibre reinforced membrane formulated to provide a tough, long lasting water barrier under tiling systems.

PACKAGING

Single component: 20kg (approx 15 litres) or 6.5kg (approx 5 litres).

TABLE 1

	Thickness per Coat		Total Dry Film Thickness (2 coats)	Theoretical Coverage		Per Unit
	Dry Film	Wet Film		Per coat	For 2 coats	
FLOORS	0.5mm	1.0mm	1.0mm	15m ²	7.5m ²	20kg(15L) unit
WALLS	0.25mm	0.5mm	0.5mm	30m ²	15m ²	20kg(15L) unit

SHELF LIFE

12 months when stored in the original unopened packaging, in a dry place at 23°C. Do not store in direct sunlight. Replace lid tightly after use. Use remaining contents from part used containers within 3 months.

COVERAGE

Two coats are recommended for an effective waterproof membrane.

Coverage will vary depending on the porosity of the surface.

One 20kg (15 litre) unit will cover approximately 7.5-15m² (based on two coats) depending on area requirements between wall and floor surfaces to be treated. Refer Table 1.

DRYING TIMES**Recoat time**

1-2 hours at (23°C/50% RH) between first and second coats. Alternatively, if a polyester mat is used between coats then the second coat can be applied whilst the first coat is still wet.

Dry through

The slowest drying areas are those where the membrane has been applied over a silicone bond breaker, eg. wall and floor junctions. The membrane cannot be tiled over until these critical areas are completely dry. Ardex WPM 001 is totally dry in 48 hours at 23°C/50% RH, but can take up to 72 hours at 10°C/50% RH in corners or for thick films.

Fully cured

The shower should not be used until the membrane has reached its full strength. Ardex WPM 001 membrane is fully cured after 3 days at 23°C, or after 5 days at 10°C.

Drying times will vary depending on humidity, surface temperature and surface porosity.

Do not apply on substrates where the surface temperature is below 10°C or above 35°C.

CLEANING

Wash hands, brushes, rollers, etc, with water while the membrane is still fresh. Remove cured material with mineral turpentine.

SAFETY PRECAUTIONS

Do not use the product in the following situations:

- Areas subject to negative hydrostatic pressure or rising damp, unless treated with Ardex WPM 300.
- Where the substrate is wet – wet surfaces can be sealed with one coat of Ardex WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight.
- Where rain is imminent.
- Where the membrane will be left exposed and subjected to regular foot traffic.
- On glazed, glass or other totally impervious surfaces (eg. areas pre-treated with water repellants).
- Where the surface temperature is below 10°C or greater than 35°C.
- All floor areas must have adequate falls either built into the substrate or achieved with a sand/cement screed prior to application of the Ardex WPM 001.

For substrates or situations other than those listed contact Ardex.

SAFETY DATA

Ardex WPM 001 is non-hazardous and non dangerous. It may produce discomfort of the eyes, respiratory tract and skin. Do not breathe gas/fumes/vapour/spray. Avoid contact with skin. Wear eye/face protection. In case of contact with eyes, rinse with plenty of water and seek medical advice.

ADDITIONAL INFORMATION IS LISTED IN THE MATERIAL SAFETY DATA SHEET.

QUALITY PRODUCT

Ardex WPM 001 is manufactured and tested to Ardex procedures which are maintained in accordance with Quality System Standard ISO 9001.

Superflex Bathroom & Balcony Premixed - 1 Part Undertile Waterproofing Membrane

USER NOTES

The technical details and recommendations contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is the responsibility of the user to ensure that the product is used in accordance with Ardex instructions and in applications for which they are intended.

APPLICATION

Apply Ardex WPM 001 by brush or roller. A medium nap (12-15mm pile) paint roller is recommended. New rollers should be dampened with water before being used for the first time.

For best results with a paint brush use a good quality, 50mm long bristle variety.

To achieve the required dry film thickness per coat, application must consist of laying the product onto the surface and light finish the surface. Do not try to apply in the same manner as a building paint. A conventional building paint is normally applied at 25-40 micrometers wet film thickness while Ardex WPM 001 needs to be applied at between 0.5 and 1.0 mm per coat depending on product and application (Refer Table 1).

Critical Areas:

INTERNAL WET AREAS

1. Construction should be in accordance with Australian 3740 - 2004 Waterproofing of wet areas within residential buildings.
2. All render and tile bed requirements should be completed before application of the membrane and tiles or other floor coverings should be direct bonded to the membrane.
3. Ensure wall & floor sheets are installed as per sheet manufacturer's recommendations.
4. Ensure suitable brick/concrete hobs are used (do not use timber).

5. Ensure that falls to the waste are min 1:60 (ie. approx. 30mm in 2mtr)) before waterproofing. Ensure outlet pipes are fixed securely and that the waste or drainage flanges are recessed into the floor.
6. Avoid sheet joints in shower recess floor. Ensure that sheets are securely fixed to the wall at the bottom edge, and sheet joints are sealed with a neutral cure silicone sealant spread approximately 6mm on either side of the joint.
7. Treat nail and screw holes with neutral cure silicone sealant.
8. Seal the perimeters of taps, shower outlets and waste outlets with neutral cure silicone sealant.
9. Apply a bead of neutral cure silicone sealant to all horizontal and vertical corners.
10. Apply a bead of neutral cure silicone sealant to the junction of the hob or angle and walls. Spreading the sealant to 6mm on either side of the joint.
11. Waste outlets shall incorporate a puddle flange or similar in accordance with AS3740 & the top surface shall be set flush with the surface to which the membrane is to be applied. A bead of neutral cure silicone shall be applied across the intersection of the puddle flange and the screed/floor.
12. Apply the membrane to the entire shower recess floor and down into waste or drainage flange. Apply the membrane over the hob and at least 150mm beyond the outside edge of the hob (ideally to entire wet area floor).
13. Apply the membrane 1800mm up the walls or to the height of the shower rose within the shower recess.
14. Install the shower screen to inside edge of the hob.

Fig.1 – Shower Recess – Critical Areas

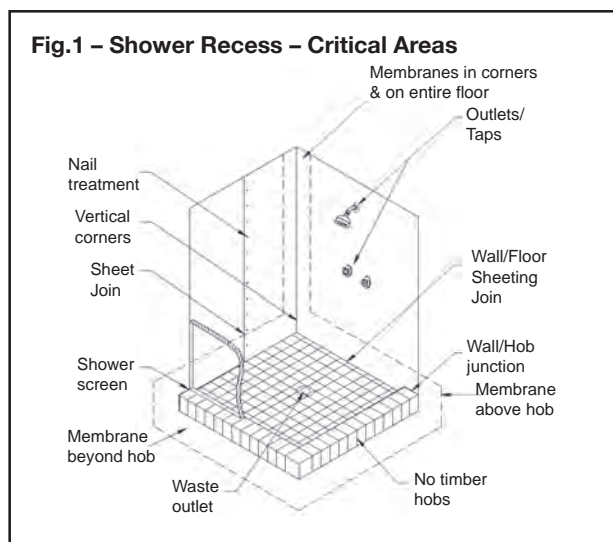
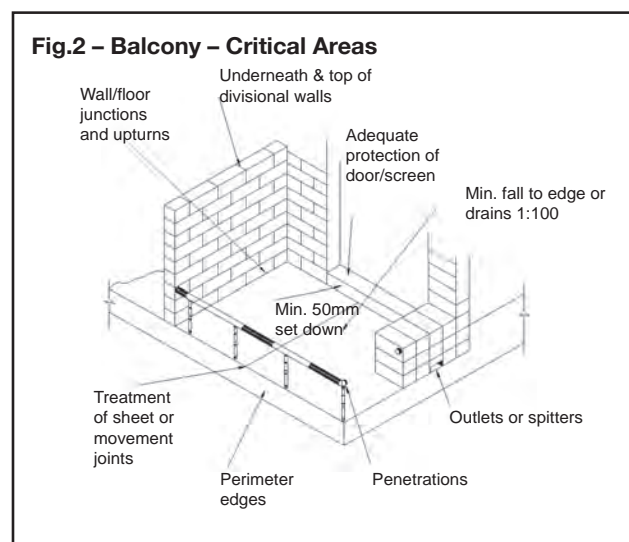


Fig.2 – Balcony – Critical Areas



BALCONIES AND DECKS

1. Ensure that the deck is constructed with falls to edge/drains of min 1:100 (ie. 20mm in 2m) or else achieve the fall with a sand/cement screed.
2. Ensure a min set down (step down) of 50mm to the finished floor level (ie. top of tiles).
3. Ensure suitable flashing is installed, ideally prior to the installation of the balcony screen/ sliding door.
4. Treat any sheet joints with a neutral cure silicone prior to waterproofing.
5. Prepare and seal all wall/floor junctions with a bead of neutral cure silicone.
6. Apply the membrane up the step down and as far up underneath the screen door flashing as possible (ideally waterproof prior to installing door).
7. Where possible, apply the membrane prior to building divisional walls, or other items such as planter boxes.
8. Apply the membrane to the entire balcony floor and at least 50mm up the wall above the top surface of the finished tiles and finished below the wall drainage vents.
9. Apply the membrane to the top of the parapets and divisional walls, or else install suitable metal capping.
10. Apply the membrane down over the front edge of the balcony onto the drip rail.
11. Carefully seal any gaps around balcony penetrations prior to applying the membrane.
12. Apply the membrane down into outlets and drains, ensuring excess material is removed.
13. Ensure all weep holes are above the membrane application area.

APPLICATION NOTES

Surface preparation

- Ensure all surfaces are structurally sound and totally dry. The pores of concrete surfaces should be open (absorbent surface). All sheet substrates must be securely fixed in accordance with the manufacturers instructions.
- Falls to outlets of at least 1:60 or approx. 30mm in 2mtr (wet areas) or 1:100 externally, must be achieved prior to tiling.
- The surface to be coated should be free from dust, oil, paint, curing compounds and any other contaminating materials.
- Damaged concrete should be repaired (leveled) and surface defects including all cracks and sharp protrusions should be treated prior to the application of the membrane.

- Remove laitance on concrete or screeds by mechanical means.
- Highly dense (>40MPa) or steel trowelled concrete should be roughened by suitable mechanical means (shot blasting, grinding, etc).

Priming

The primer is a critical part of the waterproofing system. Apply one coat of Ardex WPM 265 (Sheltercoat/ Superflex Water Based Primer) by brush or roller to all areas to be waterproofed including the floor waste. Allow the primer to completely dry prior to the application of the Ardex WPM 001 membrane. This will take around 20-30 minutes depending upon weather conditions and porosity of the substrate. Coverage is approximately 6m² per litre. Plastic (eg. PVC) pipes should be primed with a solvent based plumbers pink primer. Prime metal surfaces with a suitable metal primer such as epoxy polyamide primer.

GENERAL APPLICATION

Crack preparation

Cracks <2mm:

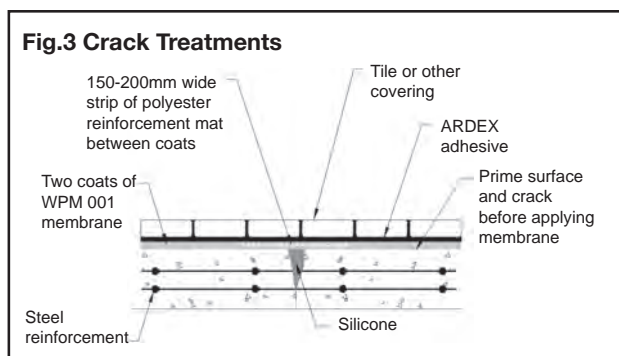
Clean and remove any loose particles in the crack. Prime the crack and adjacent area carefully with Ardex WPM 265 and allow to dry before applying two coats of Ardex WPM 001 membrane in a band at least 200mm wide equidistantly across the crack, along the length of the crack.

Cracks 2-6mm:

(Refer Fig. 3) Prepare and prime the crack as above. Apply a bead of neutral cure silicone into the crack and extend it 6mm either side. Apply a 300mm wide band of Ardex WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of Ardex "Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth preferably using a fluted roller, and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

Cracks >6mm:

Contact your local Ardex representative.



Superflex Bathroom & Balcony Premixed - 1 Part Undertile Waterproofing Membrane

Movement/construction joints

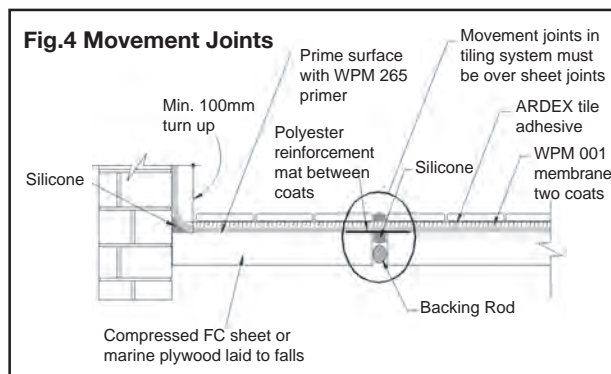
Movement joints (<6mm)

Use same procedure as in crack preparation.

Clean and prime the joint before filling it with a bead of neutral cure silicone and extending it 6mm each side of joint. Apply a 300mm wide band of Ardex WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of Ardex "Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the mat and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

Construction joints (>6mm)

Use the same procedure as above, but replace the reinforcing mat with 120mm of Ardex Coving Bandage. Note: if tiling, movement joints should be taken to the surface of the tiles. Fill the joints between the tiles immediately above the movement joints with an appropriate joint sealant. (Refer Fig.4)



Corners & coving areas

After priming with Ardex WPM 265 and allowing to dry, apply a generous bead (12mm) of neutral cure silicone sealant to seal all junctions between two substrates in coving areas and corners. Smooth over the silicone so that it extends 6mm up the wall and 6mm over the floor and allow to touch dry.

Apply a first coat of Ardex WPM 001 to the area and allow the membrane to dry.

Apply a second coat ensuring that excess product is removed from the junction (the final dry film thickness should be minimum of 1.0mm). Alternatively, if a polyester reinforcement mat is used between coats then the second coat can be applied as soon as the mat is fully bedded into the first coat.

WALL/FLOOR JUNCTION

After priming with Ardex WPM 265 and allowing to dry, apply a generous bead (12mm) of neutral cure silicone sealant to seal all junctions between two substrates. Smooth over the silicone so that it extends 6mm up the wall and 6mm over the floor and allow to touch dry. Place a 190mm wide band of Ardex "Deckweb" polyester woven mat reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. The Ardex WPM 001 should be applied to at least 100 mm up the wall surfaces as per the recommendations for the application of Ardex WPM 001 to floors.

Walls

Two coats of Ardex WPM 001 are required to achieve a minimum total dry film thickness of 0.5mm.

After priming with Ardex WPM 265 and allowing to dry, apply two coats of Ardex WPM 001 (to achieve a minimum dry film thickness of 0.5mm) in two opposite directions. Wall sheet joints should be treated with a neutral cure silicone, PVC duct tape or base jointing compound. In balcony situations take the membrane up underneath any existing cover flashing or install appropriate flashing. Allow the first coat to dry before applying the second coat.

Floors

Two coats of Ardex WPM 001 are required to achieve a minimum total dry film thickness of 1.0mm. The flooring recommendations should be extended at least 150 mm up all perimeter walls.

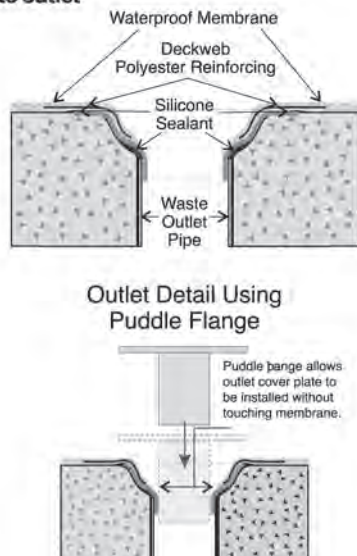
Prime the surface with Ardex WPM 265 and allow to dry.

Apply the first coat over the primed surface and allow it to dry (1-2 hours at 23°C, 50%RH) before applying a second coat in an opposite direction. In shower recesses a drainage flange must be installed on all timber/sheeted floors, and are strongly recommended on all other substrates. Where possible rebate the flange into the floor. Seal the perimeter of the flange with neutral cure silicone treatment. If a flange is not installed the membrane must be applied down into the pipe. (Refer Fig.5) Allow the membrane to dry completely before tiling. Refer drying times above.

Waste Outlet

Prime the surface with Ardex WPM 265 and allow to dry. Surfaces of the outlet flange must be primed with an appropriate primer.

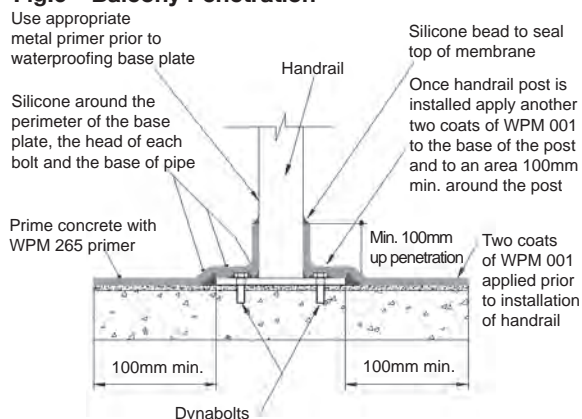
Apply Ardex WPM 001 over the adjacent floor surface extending down into the waste outlet flange overlapping the edge of flange by at least 30mm. Place Ardex "Deckweb" polyester woven mat reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. (Refer Fig. 5)

Fig.5 – Waste outlet**Balcony penetrations (Refer Fig.6)**

All upstands are to be mechanically fixed through the membrane, which must be fabricated with a base plate flange.

Prime the metal with an appropriate metal primer such as an epoxy polyamide primer and allow to dry. Apply a 10mm bead of neutral cure silicone around the perimeter of the penetration. Apply the first coat of Ardex WPM 001 on the substrate and the flanged metal.

Allow first coat to dry before applying a second coat ensuring a finished dry film thickness of no less than 1.0mm is achieved. Place a suitable flashing collar around the penetration sealing it with a suitable sealant.

Fig.6 – Balcony Penetration**Tiling systems**

It is advisable to conduct a flood test of the shower once the membrane has cured (normally after 72 hours), and before the tiling commences. A broad range of Ardex tile adhesives can be used over Ardex membranes. Contact Ardex or your nearest Ardex stockist for advice on the most suitable system.

TECHNICAL DATA**Ardex WPM 001 (Superflex Premixed)
Characteristics of liquid**

Form & Colour	Blue viscous paste
Type	Single part
Specific Gravity	Approx. 1.34kg/litre
pH of Liquid	8.5
Viscosity of Liquid (RVT Brookfield, spindle 7 speed 10)	52,000cps
Non Volatile Matter (volume) AS1321.10	50.3%±1
Tensile Strength 7 days dry AS1145	1.04 MPa
Full Cure	1.92 MPa
Elongation at Break 7 days dry AS1145	780%

Conforms to requirements of class 3 membrane of AS/NZ 4858: 2004 Wet Area Membranes.

NOTE: Most of the tests have been carried out in the Ardex laboratory under standard conditions (23±2°C, 50±5% R.H)



Technical Specification

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
171675 10/11/2017 nicolah

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WE VALUE YOUR FEEDBACK

To continue with the development of our products and systems, we value your input. Please send any suggestions, including your name, contact details, and relevant sketches to:

Ask James Hardie™

Fax 0800 808 988

literaturefeedback@jameshardie.co.nz

THIS TECHNICAL SPECIFICATION
IS FOR AXON® PANEL DIRECT
FIXED AND FIXED TO CLD®
STRUCTURAL CAVITY BATTEN.

1 Application and scope

1.1 APPLICATION

Axon® Panel is manufactured by James Hardie using an advanced lightweight cement composite. Base composition is portland cement, ground sand, cellulose fibre and water. Axon Panel has vertical grooves along the panel. It is classified as lightweight wall cladding suitable for residential and light commercial buildings using timber framing.

- Axon Panel is ideal for achieving feature walls in areas such as gable ends and entrance ways.
- Axon Panel is primed on the face to take a suitable paint finish in any colour.
- Axon Panel 133 Smooth - the grooves on the face panel are nominal 10mm wide x 2.25mm deep and spaced at 133mm centres.
- Axon Panel 133 Grained - the grooves on the face panel are nominal 10mm wide x 2.25mm deep and spaced at 133mm centres. Between the grooves is a look of traditional wood-grain texture.
- Axon Panel 400 Smooth - the grooves on the face panel are nominal 10mm wide x 2.25mm deep and spaced at 400mm centres.

Specifier

If you are a specifier or other responsible party for a project, ensure that the information in this document is appropriate for the application you are planning and that you undertake specific design and detailing for areas which fall outside the scope of these specifications.

Installer

If you are an installer ensure that you follow the design, moisture management principles, associated details and material selection provided by the designer. All of the details provided in this document must be read in conjunction with this specification.

Make sure your information is up to date

When specifying or installing James Hardie products, ensure you have the current manual. If you're not sure you do, or you need more information, visit www.jameshardie.co.nz or Ask James Hardie™ on 0800 808 868.

1.2 SCOPE

The scope of this specification for the use of Axon Panel is limited to buildings which fall within the scope limitations of 'Acceptable Solution E2/AS1 paragraph 1.1' of the New Zealand Building Code (NZBC).

This document is intended for use by architects, designers and specifiers who may be involved with the specification of Axon Panel.

This manual covers the use of Axon Panel for both construction methods i.e. direct fixed to framing or cavity construction, used in external walls of timber framed buildings up to 2.5kPa.

Please refer to E2/AS1 for further information regarding the selection of construction methods to be used for fixing claddings.

1.3 DETAILS

Various Axon Panel figures are provided in the Details section of this document. This specification and details in dwg, dxf, jpg and pdf file format are also available for download at www.jameshardie.co.nz.

All dimensions shown are in millimetres unless noted otherwise.

1.4 SPECIFIC DESIGN

For use of Axon Panel outside this published scope, the architect, designer or engineer must undertake specific design.

For advice on designs outside the scope of this specification, Ask James Hardie on 0800 808 868.

2 Design

2.1 COMPLIANCE

Axon Panel complies with E2 of the NZBC as an alternate solution.

Axon Panel cladding has been tested as per E2/VM1 of the NZBC and it passes the test performance requirements. Axon Panel also complies with durability requirements of 'B2' clause of the NZBC.

2.2 RESPONSIBILITY

The specifier or other party responsible for the project must run through a risk matrix analysis to determine which construction method is to be used. The designer must also ensure that the figures published in this specification are appropriate for the intended application and that additional detailing is performed for specific design or any areas that fall outside the scope of this specification. The designers should ensure that the intent of their design meets the requirements of the NZBC.

All New Zealand Standards referenced in this manual are current edition and must be complied with.

James Hardie conducts stringent quality checks to ensure that any product manufactured falls within our quality spectrum. It is the responsibility of the builder to ensure that the product meets aesthetic requirements before installation. James Hardie will not be responsible for rectifying obvious aesthetic surface variations following installation.

2.3 SITE AND FOUNDATION

The site on which the building is situated must comply with the NZBC Acceptable Solution E1/AS1 'Surface Water'.

Foundations design must comply with the requirements of NZS 3604 'Timber-framed Buildings' or be as per specific engineering design.

The grade of adjacent finished ground must slope away from the building to avoid any possibility of water accumulation in accordance with the NZBC requirements.

2.4 SURFACE CLEARANCES

The clearance between the bottom edge of cladding and paved/unpaved ground must comply with section 9.1.3 of E2/AS1. The finished floor level must also comply with these requirements. These clearances must be maintained throughout the life of the building.

Axon Panel must overhang the bottom plate on a concrete slab by a minimum of 50mm as required by NZS 3604.

Axon Panel must have a minimum clearance of 100mm from paved ground, and 175mm from unpaved ground. On roofs and decks, the minimum clearance must be 50mm.

Do not install external cladding such that it may remain in contact with water or ground. Refer Figures 3 and 18.

2.5 MOISTURE MANAGEMENT

It is the responsibility of the specifier to identify moisture related risks associated with any particular building design.

Wall construction design must effectively manage moisture, considering both the interior and exterior environments of the building, particularly in buildings that have a higher risk of wind driven rain penetration or that are artificially heated or cooled.

Walls must include those provisions as required by the NZBC Acceptable Solution E2/AS1 'External Moisture'. In addition all wall openings, penetrations, junctions, connections, window sills, heads and jambs must incorporate appropriate flashings for waterproofing. The other materials, components and installation methods used to manage moisture in external walls, must comply with the requirements of relevant standards and the NZBC.

For further guidance on designing for weathertightness refer to BRANZ Ltd, and the Ministry of Business Innovation and Employment (MBIE) updates on the following websites respectively, www.branz.co.nz and www.building.govt.nz

2.6 STRUCTURE

2.6.1 Timber framing

Timber-framed buildings must be designed in accordance with NZS 3604 (Timber-framed Buildings). When the framing is provided as per the specific engineering design, the framing stiffness must be either equivalent to or more than the stiffness requirements of NZS 3604.

For timber frame walls longer than 12m it is best practice to allow for construction joints to accommodate movements generated due to timber shrinkage or deflections etc.

2.6.2 Wind loading

Axon Panel is suitable for use in all wind zones in New Zealand up to and including EH as defined in NZS 3604.

A specific design is required for all situations where the buildings falls outside the scope of NZS 3604 and E2/AS1.

2.7 BRACING

Axon Panel direct fixed can be used to achieve structural bracing when fixed with stainless steel HardieFlex™ nails. For further information refer to the James Hardie Bracing Design Manual.

Axon Panel installed to CLD Structural Cavity Battens as per this specification cannot be used to achieve structural bracing. However, bracing can be achieved by using James Hardie rigid air barrier board installed direct to framing instead of a flexible underlay or by using Villaboard® Lining bracing system on the internal face.

2.8 FIRE RATED WALLS

Axon Panel when direct fixed with HardieFlex nails to external walls can achieve fire ratings up to 60/60/60 to comply with C/AS1 of the NZBC when the walls are constructed in accordance with the current James Hardie 'Fire and Acoustic Design Manual'.

When using Axon Panel fixed to CLD Structural Cavity Battens, a fire rating of up to 60 minutes can be achieved using RAB® Board in conjunction with the fire rated system requirements as specified in the James Hardie 'Fire and Acoustic Design Manual'. Ask James Hardie on 0800 808 868 for further information.

Axon Panel is classified as a non-combustible material suitable for use on walls close to boundary.

2.9 ENERGY EFFICIENCY

External walls constructed as per this technical specification using Axon Panel, bulk insulation, where the area of glazing is 30% or less of the total wall area comply with the requirements for walls in the NZBC Acceptable Solution H1/AS1 (NZBC Clause H1 Energy Efficiency), Replacement Table 1. To meet thermal insulation requirements for the construction, the bulk insulation as specified in Table-1 must be used. This insulation may be substituted with insulations having higher R-values. The thermal insulation of a wall gets affected when the depth of the timber framing is increased or decreased. The calculation used in Table 1 is based on a timber framing size 90 x 45mm and using an internal lining material such as James Hardie Villaboard® Lining or a 10mm plasterboard.

Table 1

Insulation capability		
Climate Zone	Construction R-Value Requirement	Minimum R-Value of Insulation Required
1 and 2	1.9 m ² °C/W	#R2.0
3	2.0 m ² °C/W	#R2.2
Total construction R-Value depends on the insulation material used and the framing ratio. The insulation material R-Values specified in this table are for studs spaced at 600mm c/c and nogs spaced at 800mm c/c.		
# To achieve higher R-Values of construction the wall insulation material must be replaced with an insulation material having higher R-Values to suit the requirements.		
For further guidance on insulation requirements refer to the current edition of 'House Insulation Guide' published by BRANZ.		

3 Framing

3.1 GENERAL

This Axon Panel technical specification is only suitable for timber-framed buildings. Other framing materials are subject to a specific engineering design.

3.2 TIMBER FRAMING

3.2.1 Dimensions

A minimum 45mm wide stud is required.

3.2.2 Structural grade

Minimum timber grade requirement is No. 1 framing grade or MSG6 as per NZS 3604. The grading of timber must comply with the AS/NZS 1748 and NZS 3631 requirements.

3.2.3 Durability

The external framing must be treated to a minimum H1.2 treatment. Refer to the NZBC Acceptable Solution B2/AS1 'Durability' for further information about the durability requirements.

For timber treatment and allowable moisture content information refer to NZS 3602 (Timber and Wood-Based Products for use in Buildings) and NZS 3640 (Chemical Preservation of Round Sawn Timber) for minimum timber treatment selection and treatment requirements.

Also refer to the framing manufacturer's literature for further guidance on timber selection. Framing must be protected from moisture at site in accordance with the recommendation of the framing manufacturers.

3.2.4 Frame construction

The framing must fully support all panel edges. The framing must be rigid and not rely on the cladding panel for stability.

Timber framing sizes and its set-out must comply with NZS 3604 and as specified in this specification.

In case of gable end trusses sitting on top plates of the external wall frame, the frame size must comply with the minimum timber sizes stipulated for wall frames in Section 8 of the NZS 3604.

For timber frame walls longer than 12m, it is best practice to allow for construction joints to accommodate movements generated due to timber shrinkage or deflections generated by loadings etc.

3.3 STEEL FRAMING

Refer to James Hardie Steel Frame Technical Specification about the installation of Axon Panel to steel frame.

3.4 CONSTRUCTION METHODS

3.4.1 Direct fixed

For direct fixed construction method the following framing is required:

- Studs at 600mm c/c maximum
- A minimum 45mm stud width is required at vertical panel joints
- Nogs/dwangs are required at 1200mm c/c maximum.

3.4.2 CLD Structural Cavity Batten

For cavity construction method the following framing is required:

- When studs are spaced at 600mm centres maximum, the nogs/dwangs must be provided at 800mm centres maximum
- When studs are spaced at 400mm centres then the nogs/dwangs may be provided at 1200mm centres
- An extra stud is required in internal corners. Refer to Figure 21.

3.5 TOLERANCES

In order to achieve the required performance and an acceptable wall finish, it is imperative that framing is straight and true.

Framing tolerances must comply with the requirements of NZS 3604. All framing shall be made flush.

4 Preparation

4.1 FLEXIBLE UNDERLAY OR HOMERAB PRE-CLADDING

Flexible underlay or HomeRAB® Pre-Cladding must be provided as per the requirements of the NZBC Acceptable Solution E2/AS1 'External Moisture' and NZS 3604. The flexible underlay must comply with Table 23 of E2/AS1 and AS/NZS 4200.1. The flexible underlay must be fixed in accordance with E2/AS1, NZS 3604 and AS/NZS 4200.2 and the underlay manufacturer's recommendations.

Walls which are not lined on the inside face (e.g. garage walls or gable ends) must include a rigid sheathing or an air barrier behind the cladding which complies with the requirements of the NZBC Acceptable Solution E2/AS1 Table 23. For attached garages, flexible underlays must be selected in accordance with the NZBC Acceptable Solution E2/AS1, paragraph 9.1 3.4. HomeRAB Pre-Cladding is suitable for use in these applications. It must be installed in accordance with the James Hardie Rigid Air Barriers installation manual.

4.2 RIGID AIR BARRIER

For EH wind zone or Specific Engineering Design projects where the wind pressures are higher than 1.5kPa (ULS), RAB Board (6mm) must be used. Refer to the James Hardie rigid air barriers installation manual for information regarding its installation. For buildings within the scope NZS 3604 HomeRAB Pre-Cladding Lining (4.5mm) or flexible underlays can be used.

4.3 VENT STRIP

The James Hardie uPVC cavity vent strip must be installed at the bottom of all walls constructed using the drained and ventilated cavity construction method. It is important that the openings in the vent strip are kept clear and unobstructed to allow free drainage and ventilation of cavities. James Hardie uPVC vent strip has an opening area of 1000mm²/m length.

4.4 FLASHING

All wall openings, penetrations, intersections, connections, window sills, heads and jambs must be flashed prior to panel installation. Please refer to moisture management requirements in Clause 2.5. The flexible underlay or RAB Board must be appropriately taped around the penetrations and lapped/taped to flashings. Materials must be lapped in such a way that water tracks down to the exterior of a building. James Hardie will assume no responsibility for water infiltration within the wall due to poor installation of flashings or flexible underlays. The selected flashing materials must comply with the durability requirements of the NZBC. For information refer to Table 20 of clause E2 of the NZBC.

When using a James Hardie rigid air barrier board the entire framing around window opening must be sealed with a flashing tape. The tape must be finished over the face of James Hardie rigid air barrier board. The flashing tapes like SUPER-STICK Building Tape® by Marshall Innovations or 3M™ All Weather Flashing Tape 8067 by 3M™ are recommended for use with James Hardie rigid air barrier board. Refer to the tape manufacturer's literature for further information regarding their installation.

4.5 JUNCTIONS AND PENETRATIONS

Refer to Clause 2.5 of this specification for moisture management requirements. All windows and doors must be detailed as per the requirements of this specification. James Hardie has developed the window details for Axon Panel which meet the requirements of E2 'External Moisture', an approved document of the NZBC. Refer to Figures 8 to 10 and 24 to 26.

5 Batten installation

Note: This specification is not for timber cavity battens. Refer to separate technical specification from James Hardie.

5.1 CLD STRUCTURAL CAVITY BATTENS

Buildings with a risk score of 7-20 calculated in accordance with Table 2 of Acceptable Solution E2/AS1 of the NZBC, require Axon Panel to be installed on a cavity. CLD Structural Cavity Battens provide airspace between the frame and the panel and are used to fix cladding into them.

CLD Structural Cavity Battens are made of a low density fibre cement formulation which enables them to have extra strength and durability. CLD Structural Cavity Batten is sealed on all sides and is suitable to fix Axon Panel installed as per this technical specification, and it can withstand the design wind pressures exerted on a cladding within the scope of NZS 3604.

The CLD Structural Cavity Battens are made 2450mm long and 19mm thick. The battens are fully sealed on all sides.

5.2 BATTEN LAYOUT

CLD Structural Cavity Battens must be fixed to the wall framing over flexible underlay or James Hardie rigid air barrier. The smoother face of batten should face towards the cladding.

CLD Structural Cavity Battens are suitable to withstand wind pressures up to 2.5kPa (ULS). For batten fixing, refer to section 5.4. Ensure the battens are straight and provide a flat surface to fix Axon Panel to. Site cut ends of battens must be sealed on site with Dulux® Acraprime 501/1 sealer or Resene Quick Dry.

The battens are run continuously over the studs but they must not be run continuously over the floor joists. There must be a 15mm gap between the battens at floor joist level to allow for structural shrinkages and deflections. Refer to Figure 27.

CLD Structural Cavity Battens can be butt jointed over the studs within the floor height. The batten ends must be cut between 20° to 45° and be installed in a way that the butt joint deflects the moisture to the exterior. The ends must be sealed and jointed with the adhesive sealant before butting them together. Refer to Figure 23.

The designer must ensure that the CLD Structural Cavity Battens are not used in situations where design wind pressures are above 2.5kPa (ULS).

CLD Structural Cavity Battens must always be at least 300mm in length.

5.3 INTERMEDIATE SUPPORT

Where studs are at 600mm centres an intermediate means of restraining the flexible underlay and insulation from bulging into the cavity shall be installed. An acceptable method to achieve this is using a:

- 75mm galvanised mesh; or
- polypropylene tape at 300mm centres fixed horizontally and drawn taut.

No intermediate supports are required:

- when studs are spaced at 400mm centres; or
- when RAB Board instead of flexible underlays are used.

5.4 BATTEN FASTENERS

The CLD Structural Cavity Batten must be fixed to the framing as specified in Table 2. The fasteners must be driven at a minimum distance of 50mm from the batten ends.

Table 2

Batten fixing				
Fixing Type	Framing	Basic Wind Pressure kPa (ULS)	Batten centres max. (mm)	Fixings centres max. (mm)
65mm x 2.8mm RoundDrive ring shank nail hot dip galv./ s.steel	Timber	Up to 1.5 (Up to and including VH wind zone)	600	250
		Up to 2.5 (>VH wind zone)	400	200
50mm x 9-10g Countersunk head steel screw class 3/4	*Steel 0.55 to 1.6mm BMT	Up to 1.5 (Up to and including VH wind zone)	600	250
		Up to 2.5 (>VH wind zone)	400	200

For fastener durability information, refer to Clause 6.2 of this document.

CLD Structural Cavity Battens less than 400mm in height must have fixings at maximum 150mm centres.

Battens must be fixed over studs.

6 Panel fixing

6.1 GENERAL

Axon Panel must be kept dry and under cover whilst in storage or during the installation. Every endeavour must be made to keep framing dry once panel fixing commences. All site-cut panel edges must be sealed prior to installation.

- The shiplap jointing of panels is only suitable for vertical fixing of panels.
- Do not fix in the groove of Axon Panel.
- Ensure the sheets are from the same batch.
- It is recommended to fix from the centre of the panel and work outwards.
- Do not overdrive fasteners.
- Fixings must be finished flush with the panel surface.

6.2 FASTENER DURABILITY

Fasteners must meet the minimum durability requirements of the NZBC. NZS 3604 specifies the requirements for fixing material to be used in relation to exposure conditions and are summarised in Table 3.

Table 3

Exposure conditions and nail selection prescribed by NZS 3604		
NAIL MATERIAL		
Zone D*	Zone C* outside sea spray zone, Zone B and Geothermal hot spots	Bracing — All Zones
Grade 316 Stainless	Hot-dipped galvanised or Grade 316 stainless	Grade 316 Stainless

*(Zone C areas where local knowledge dictates that increased durability is required, appropriate selection shall be made). Microclimate conditions as detailed in NZS 3604, paragraph 4.2.4 require SED.

Also refer to the NZBC Acceptable Solution E2/AS1 Table 20 and 21 for information regarding the selection of suitable fixing materials and their compatibility with other materials.

6.3 FASTENER — TYPE, SIZE AND LAYOUT

6.3.1 Direct fix

Axon Panel must be fixed to framing using the fixings as specified in Table 4 below and follow the edge distance required for nails as shown in the details. Refer to Figures 2 and 4.

Table 4

Panel fixing		
DIRECT FIXED TO FRAME USING HARDIEFLEX NAILS OVER FLEXIBLE UNDERLAY		
40 x 2.8mm HardieFlex nails.	Fix @ 200mm centres to all framing. Stud width 45mm min. required at vertical joint.	

DIRECT FIXED TO FRAME USING BRAD NAIL OVER FLEXIBLE UNDERLAY		
ND 50 stainless steel straight brad nail	Up to 1.5kPa (Up to and including VH wind zone)	Fix 150mm c/c on panel edges and intermediate framing

Notes:

1. Brad nail fixing method is only suitable up to very high wind speed zones. Do not use this method for EH wind zones described in NZS 3604 or SED projects.
2. Nails must be finished flush with panel surface.
3. Special fixing arrangements are required for bracing and fire-resistance rated wall systems.

For more information Ask James Hardie on 0800 808 868.

When fixing the panels using nail guns, refer to the nail gun manufacturer for information about nails and the type of nail gun to be used.

Note: Do not use 'D' head nails.

6.3.2 CLD Structural Cavity Batten Method

This panel fixing method can be used up to 2.5kPa wind pressure. Axon Panel is only fixed into the CLD Structural Cavity Batten as per this method.

Adhesive sealant

A polyurethane adhesive sealant Seal N Flex-1 manufactured by Bostik or SikaFlex 11FC by Sika are recommended for use in the installation of these products. Apply a 6mm continuous bead of this adhesive sealant over the face of the CLD Structural Cavity Batten before fixing the Axon Panel. Refer to Figure 19, 20 and 21.

When using external box corner flashing, use a 10mm thick bead of adhesive over the aluminium box corner flanges. Refer to Figure 22.

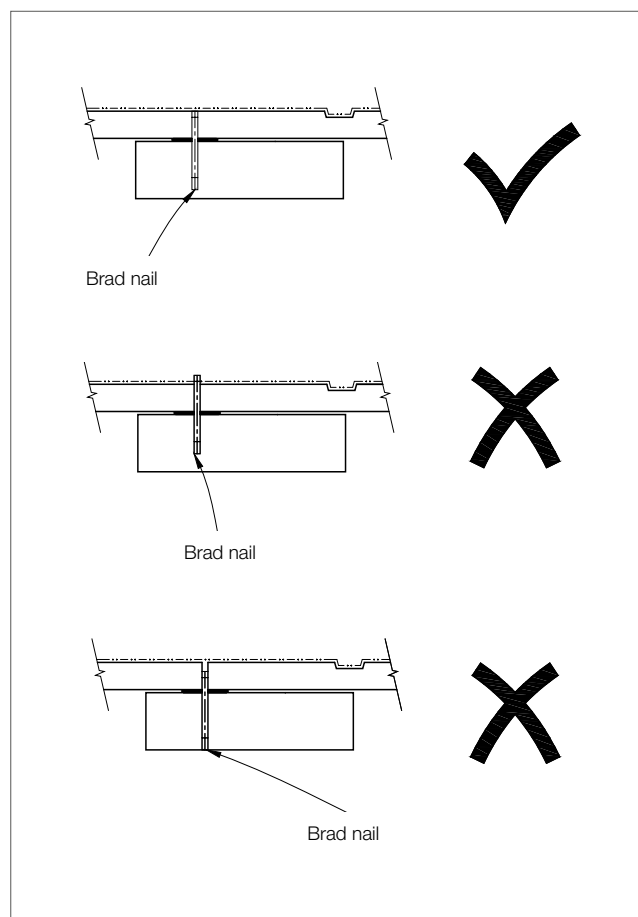
Note: Do not use excessive adhesive.

6.3.3 Cavity construction using timber cavity battens

When fixing Axon Panel using timber cavity battens, these details are available at www.jameshardie.co.nz or Ask James Hardie on 0800 808 868.

6.4 PANEL LAYOUT

All panel edges must be supported by the framing. The shiplap joint must be formed vertically. The framing centers must be checked before the panel installation.



Fix Axon Panel to CLD Structural Cavity Battens using one of the following fixings specified in Table 5. The edge distance at panel corner must be minimum 75mm vertically from panel corners. Refer Figure 17.

Table 5

Axon Panel Fixing		
Types of fixings to be used with adhesive sealants	Suitable up to Basic Wind Pressure kPa (ULS)	Fixing to CLD Structural Cavity Battens c/c (mm)
C-25 straight 'T'- Head stainless steel brad nail	1.5 (Up to and including VH wind zone)	150
25 x 2.5mm annular threaded fibre cement nail	2.5 (> VH wind zone)	200
25mm x 10g counter sunk screw class 3/4 or stainless steel	2.5 (> VH wind zone)	200

Notes:

- Brad nail fixing method is only suitable up to 1.5kPa.
- Nails must be finished flush with panel surface.

7 Jointing

7.1 GENERAL

Axon Panels are fixed to form a shiplap joint at vertical edges. The panels have factory-made edges to suit this jointing.

7.2 VERTICAL JOINT

Direct fixed

Axon Panels are shiplap jointed keeping a gap of 1-2mm between the panels. A 50mm wide 3259 Inseal sealing tape is used under the joint over the face of the timber stud where direct fixed construction method is used. A flexible sealant must be applied to the full length of the shiplap joint before the panels are jointed. The edge distance for a HardieFlex nail must be 18mm min. Refer to Figure 4.

Cavity construction

Fix the CLD Structural Cavity Batten over the studs and it runs behind the entire length of the shiplap joint with a 50mm overhang below the bottom plate and finishes flush with the bottom edge of panel. Refer to Figures 16 and 17. The vertical shiplap joint is formed along the centre line of the batten. A bead of sealant is applied to the vertical edge of the Axon Panel to seal the shiplap joint before fixing the panels. Refer to Figure 19. The edge distance for a brad nail must be 16mm and 18mm. Refer Figures 14 and 19.

8 Finishing

7.3 HORIZONTAL JOINT

At floor joist levels a horizontal joint must be provided to accommodate the movement resulting from timber joist shrinkage and settlement. A JH 9mm panel aluminium horizontal 'h' mould is used to form a horizontal joint. Use the aluminium 'h' mould jointer to cover over the butt joint of 'h' mould. A purpose made metal 'Z' flashing or a James Hardie uPVC flashing could also be used to flash the horizontal joint. Refer to Figures 11, 12 and 27.

7.4 EXTERNAL CORNER

A JH 9mm panel aluminium box corner mould is used to form the external box corner. The site-cut sheet edges must be sealed before butting them into the box corner. Refer to Figure 7.

Do not run the box corner flashing continuously over the floor joist. On a two storey construction the aluminium box corner is finished under the aluminium 'h' mould. A uPVC corner under flashing must be used under the box corner when in this situation. Refer to Figure 12.

For CLD Structural Cavity Batten external corner refer to Figure 22.

The bead of adhesive must be 10mm thick to accommodate for the thickness of the aluminium.

7.5 INTERNAL CORNER

Direct fixed internal corner is formed using a uPVC corner under flashing or an 80mm wide Inseal sealing strip behind the panel edges. The joint is filled with the flexible sealant. Refer to Figure 6.

For CLD Structural Cavity Batten internal corner joint detail refer to Figure 21.

7.6 FLASHING MATERIAL DURABILITY

Please refer to Table 20 of E2/AS1 of the NZBC regarding the durability requirements of various flashing materials.

8.1 PREPARATION

Painting of Axon Panel is mandatory to meet the durability requirements of the NZBC and 15 year James Hardie product warranties. Axon Panel must be dry and free of any dust or grime before painting. The panels must be painted within 90 days of their installation. There is no restriction on the LRV of paint to be applied on the Axon Panel.

When using uPVC flashings, dark colours should be avoided as it will affect the durability of uPVC flashing. The LRV of paint must be above 40% when using uPVC flashings.

Dark paints can be used when using the aluminium flashings.

Panels are pre-primed and are suitable for site applied acrylic paints. Pre-finished panels can also be installed using exposed head fasteners.

In order to seal cut edges or sanded patches, Dulux 1 Step, Resene quick dry, Taubmans Underproof Acrylic Primer Undercoat or a similar product should be applied. The primer should be compatible with the paint to be used.

Where panels are fixed with brad nails, the nail heads must be finished flush with panel surface. The nail gun should be set to nail "proud" of the panel surface and nail heads to be manually finished flush with surface. The nail heads can be skimmed over with an exterior grade 2 part builders fill if required. The skimmed area must be primed prior to site-applied finishing.

For site-applied finishes where brad nails are used. James Hardie recommends an undercoat and a minimum of two coats of acrylic paint. Follow the paint manufacturer's recommendations to prepare the surface and to adequately cover and conceal the panel fixings.

8.2 FLEXIBLE SEALANT

All sealants used must comply with the relevant requirements of the NZBC. Their application and usage must be in accordance with manufacturer's instructions. Check with sealant manufacturer prior to coating over sealants. Some sealant manufacturers do not recommend coating over their products.

9 Storage and handling

When storing Axon Panel, boards must be laid flat on a smooth level surface. Edges and corners must be protected from chipping.

To ensure optimum performance, store panels under cover and keep dry prior to fixing. If the panels become wet, allow them to dry thoroughly before fixing.

Do not carry panels on the flat, carry in the vertical position to avoid excessive bending.

10 Maintenance

The extent and nature of maintenance will depend on the geographical location and exposure of the building. As a guide, it is recommended that basic normal maintenance tasks shall include but not be limited to:

- Washing down exterior surfaces every 6-12 months*
- Re-applying of exterior protective finishes if necessary**
- Maintaining the exterior envelope and connections including joints, penetrations, flashings and sealants that may provide a means of moisture entry beyond the exterior cladding.
- Cleaning out gutters, blocked pipes and overflows as required
- Pruning back vegetation that is close to or touching the building
- The clearance between the bottom edge of Axon Panel and the finished ground must always be maintained.

*Do not use a water blaster to wash down the cladding.

*In extreme coastal conditions or sea spray zones, wash every 3-4 months.

**Refer to your paint manufacturer for washing down and recoating requirements related to paint performance.

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
171675 10/11/2017 nicolah

11 Product information

11.1 MANUFACTURING AND CLASSIFICATION

Axon Panel is an advanced lightweight cement composite building product. The basic composition is portland cement, ground sand, cellulose fibre and water. The panels are easily identified by the name 'Axon Panel' printed at regular intervals on the back face of panel.

CLD Structural Cavity Battens are manufactured using a low density fibre cement formulation. The basic composition is Portland cement, ground sand, cellulose fibre and water and proprietary additives. The battens are sealed on all sides.

Axon Panel is manufactured to AS/NZS 2908.2 'Cellulose-Cement Products Part 2: Flat Sheets' (ISO 8336 'Fibre Cement Flat Panels') standards in New Zealand. James Hardie New Zealand is an ISO 9001 'Telarc' certified manufacturer.

Axon Panel is classified Type A, Category 3 in accordance with AS/NZS 2908.2 "Cellulose-Cement Products".

For Safety Data Sheets (SDS) visit www.jameshardie.co.nz or Ask James Hardie on 0800 808 868.

11.2 PRODUCT MASS

Axon Panel is manufactured in 9.0mm thickness and has a mass of 12.1kg/m² at EMC.

Axon Panel cladding is defined as a Light Weight Wall Cladding (not exceeding 30kg/m²) as per NZS 3604.

11.3 DURABILITY

11.3.1 General

Axon Panel installed as per this technical specification will meet the durability requirements for claddings as required under clause 'B2-Durability' of the NZBC.

11.3.2 Resistance to moisture/rotting

Axon Panel has demonstrated resistance to permanent moisture induced deterioration (rotting) and has passed the following tests in accordance with AS/NZS 2908.2:

- Heat Rain (Clause 6.5).
- Water Permeability (Clause 8.2.2).
- Warm Water (Clause 8.2.4).
- Soak Dry (Clause 8.2.5).

11.3.3 Control of External Fire Spread

Axon Panel is assessed as per Appendix C C7.1.1 and is classified as 'Non-Combustible Material' which is suitable for use as external wall cladding and complies with requirements of Paragraph 5.4 of the NZBC Acceptable Solution C/AS1 and Paragraph 5.8.1 of Acceptable Solutions C/AS2 to C/AS6 of the NZBC.

11.3.4 Alpine regions

In regions subject to freeze/thaw conditions, Axon Panel must not be in direct contact with snow or ice build up for extended periods, e.g. external walls in alpine regions must be protected where snow drifts over winter are expected.

The Axon Panel has been tested in accordance with AS/NZS 2908.2 Clause 8.2.3.

12 Safe working practices

STAY HEALTHY WHEN WORKING WITH BUILDING PRODUCTS CONTAINING CRYSTALLINE SILICA

Crystalline Silica

What is it? Why and when is it a health hazard?

Crystalline Silica is

- Commonly known as sand or quartz
- Found in many building products e.g. concrete, bricks, grout, wallboard, ceramic tiles, and all fibre cement materials

Why is Crystalline Silica a health hazard?

- Silica can be breathed deep into the lungs when present in the air as a very fine (respirable) dust
- Exposure to silica dust without taking the appropriate safety measures to minimise the amount being breathed in, can lead to a potentially fatal lung disease – silicosis – and has also been linked with other diseases including cancer. Some studies suggest that smoking may increase these risks.
- The most hazardous dust is the dust you cannot see!

When is Crystalline Silica a health hazard?

- It's dangerous to health if safety protocols to control dust are not followed when cutting, drilling or rebating a product containing crystalline silica.
- Products containing silica are harmless if intact (e.g. an un-cut sheet of wall board).

FAILURE TO ADHERE TO OUR WARNINGS, SAFETY DATA SHEETS AND INSTALLATION INSTRUCTIONS WHEN WORKING WITH JAMES HARDIE PRODUCTS MAY LEAD TO SERIOUS PERSONAL INJURY OR DEATH.

AVOID BREATHING IN CRYSTALLINE SILICA DUST!

Safe working practices

- 👍 NEVER use a power saw indoors or in a poorly ventilated area
- 👍 NEVER dry sweep
- 👍 ALWAYS use M Class extractor unit as a minimum and always hose down with water/wet wipe for clean up
- 👍 NEVER use grinders
- 👍 ALWAYS use a circular sawblade specifically designed to minimise dust creation when cutting fibre cement – preferably a sawblade that carries the HardieBlade™ logo or one with at least equivalent performance.
- 👍 ALWAYS follow tool manufacturers' safety recommendations
- 👍 ALWAYS expose only the minimum required depth of blade for the thickness of fibre cement to be cut
- 👍 ALWAYS wear an approved properly-fitted, approved dust mask (P1 or P2) or respirator

Use one of the following methods based on the required cutting rate:

BEST

- Score and snap knife
- Hand guillotine
- Fibreshear

BETTER

- Dust reducing circular saw equipped with HardieBlade™ Saw Blade and M Class extractor unit.

GOOD

- Dust reducing circular saw with HardieBlade™ Saw Blade

Working outdoors

- 👍 Make sure you work in a well ventilated area
- 👍 Position cutting station so wind will blow dust away from yourself and others in the working area
- 👍 Cut products with either a 'Score or snap' knife or fibre cement shears or, when not feasible, use a HardieBlade™ Saw Blade (or equivalent) and a dust-reducing circular saw attached to a M Class extractor unit
- 👍 When sawing, sanding, rebating, drilling or machining fibre cement products, always:
 - Wear your P1 or P2 mask (correctly fitted in accordance with manufacturers' instructions) and when others are close by, ask them to do the same
 - If you are not clean shaven, then use a powered air respirator with a loose fitting head top.
 - Wear safety glasses
 - Wear hearing protection
 - When others are close by, ask them to do the same.

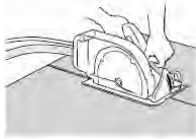
Working indoors

- 👍 Never cut using a circular saw indoors
- 👍 Position cutting station in a well ventilated area
- 👍 Cut ONLY using a score and snap knife, hand guillotine or fibreshears (manual, electric or pneumatic)
- 👍 Make sure you clean up BUT never dry sweep. Always hose down with water/wet wipe or use an M Class extractor unit

IF CONCERN STILL EXISTS ABOUT EXPOSURE LEVELS OR YOU DO NOT COMPLY WITH THE ABOVE PRACTICES, YOU SHOULD ALWAYS CONSULT A QUALIFIED INDUSTRIAL HYGIENIST.

Working Instructions

- Refer to Recommended Safe Working Practices before starting any cutting or machining of product.



HardieBlade™ Saw Blade

The HardieBlade™ Saw Blade used with a dust-reducing saw is ideal for fast, clean cutting of James Hardie fibre cement products. A dust-reducing saw uses a dust deflector or a dust collector connected to a vacuum system. When sawing, clamp a straight-edge to the sheet as a guide and run the saw base plate along the straight edge when making the cut.

Hole-Forming

For smooth clean cut circular holes:

- Mark the centre of the hole on the sheet.
- Pre-drill a 'pilot' hole.
- Using the pilot hole as a guide, cut the hole to the appropriate diameter with a hole saw fitted to a heavy duty electric drill.



For irregular holes:

- Small rectangular or circular holes can be cut by drilling a series of small holes around the perimeter of the hole then tapping out the waste piece from the sheet face.
- Tap carefully to avoid damage to sheets, ensuring that the sheet edges are properly supported.

STORAGE & DELIVERY

Keeping products and people safe

Off loading

- James Hardie products should be off-loaded carefully by hand or by forklift.
- James Hardie products should not be rolled or dumped off a truck during the delivery to the jobsite.

Storage

James Hardie products should be stored:

- in their original packaging
- under cover where possible or otherwise protected with a waterproof covering to keep products dry
- off the ground – either on a pallet or adequately supported on timber or other spacers
- flat so as to minimise bending

James Hardie products must not be stored:

- directly on the ground
- in the open air exposed to the elements

JAMES HARDIE IS NOT RESPONSIBLE FOR DAMAGE DUE TO IMPROPER STORAGE AND HANDLING.

TIPS FOR SAFE AND EASY HANDLING

Weatherboard products

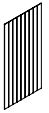
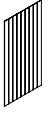
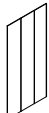
- Do not lift planked products flat and in the middle
- Carry the products on the edge
- If only one person is carrying the product, hold it in the middle and spread arms apart to better support the product
- If two people are carrying the plank, hold it near each end and on edge
- Exercise care when handling weatherboard products to avoid damaging the edges/corners

Sheet products

- Carry with two people
- Hold near each end and on edge
- Exercise care when handling sheet products to avoid damaging the edges/corners











13 Product sizes and accessories

Table 7

Axon Panel information					
Product	Description	Thickness	Size		Product Code
	Axon Panel 133 Smooth Is a shiplap jointed panel to hide the panel joints. The panel is face primed. The panel has grooves at 133mm centres. The panel must be installed vertically. Nom. Panel Mass: 12.1kg/m ²	9	Length	Width	
			2450	1200	403780
			2750	1200	403781
	Axon Panel 133 Grained Is a shiplap jointed panel to hide the panel joints. The panel is face primed. The panel has grooves at 133mm centres. The panel must be installed vertically. Nom. Panel Mass: 12.1kg/m ²	9	3000	1200	403782
			2450	1200	404510
			2750	1200	404511
	Axon Panel 400 Smooth Is a shiplap jointed panel to hide the panel joints. The panel is face primed. The panel has grooves at 400mm centres. The panel must be installed vertically. Nom. Panel Mass: 12.1kg/m ²	9	3000	1200	404512
			2450	1200	404414
			2750	1200	404415
			3000	1200	404416

Note: The actual width of the panel is 1203mm. All dimensions and masses provided are approximate only and are subject to manufacturing tolerances.

Table 8




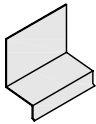
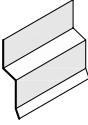







Accessories/tools supplied by James Hardie			
Accessories	Description	Quantity/Size (approx)	Code
	CLD Structural Cavity Batten 19mm thick fibre cement cavity batten installed over RAB Board or a flexible underlay. Axon Panels are fixed to the battens.	19 x 70mm, 2450mm long	403870
	JH 9mm Panel Aluminium External Box Corner A box corner mould to form the external joints. 9mm etch primed.	2450mm long	304509
		2750mm long	304510
		3000mm long	305150
		4000mm long	305808
	JH 9mm Panel Aluminium Horizontal 'h' Mould A horizontal flashing to flash the horizontal joints. 9mm etch primed.	3000mm long	304508
	Aluminium 'h' Mould Jointer A jointer to cover the butt joint of 'h' mould.	100mm long	304512
	uPVC Corner Under Flashing A 50 x 50mm corner under flashing for internal and external joints.	3000mm long	303745
	uPVC Vent Strip Used to provide protection from vermin entering cavity space.	3000mm long	302490
	Annular Threaded Nail 25 x 2.5mm nail.	500gm	300390
	INSEAL® 3259 Tape Black 50mm tape to be used under the vertical shiplap joint. Black 80mm tape to be used at corners.	50m roll	300767
			300769
	CLD Batten Corner Flashing Aluminium Used at internal corner sealant joints at floor joist level.		304652
Tools			
	HardieBlade™ Saw Blade Diamond tip 184mm diameter fibre cement circular saw blade. Spacers not included.	Each	300660

NOTE: uPVC 'h' mould and jointer accessories are also available from James Hardie.

Table 9

Accessories/tools not supplied by James Hardie

James Hardie recommends the following products for use in conjunction with Axon Panel. James Hardie does not supply these products and does not provide a warranty for their use. Please contact component manufacturer for information on their warranties and further information on their products.

Accessories	Description
	Flexible Underlay To comply with Table 23 of E2/AS1.
	Flexible Tape A flexible self-adhesive tape used in preparation of a window. Refer to the Window installation section in this manual for more information. e.g. Tyvek®, Protecto or Thermakraft or similar.
	Joint Sealant Paintable flexible sealants are recommended for filling the joints. Refer to Section 7.2 for information. e.g. Sika Silaflex MS, Sika AT Façade, Bostik Seal N Flex-1 or similar
	Head Flashing Required over window heads to be supplied by window installer. Material must comply with Table 20 and 21 of E2/AS1.
	Flashing Material as per Table 20, 'E2/AS1'
	HardieFlex™ Hot Dip Galv and Stainless Steel 316 nails For fixing panels direct to framing. 40 x 2.8mm
	C-25 Stainless Steel Brad Nails 304SS brad nails used to install Axon Panels to the CLD Structural Cavity Battens used in a straight bradder. Paslode: (09) 477 3000
	ND 50 Stainless Steel Brad Nails Used to install Axon Panel direct fix to timber framing. Used in a straight bradder.
	65 x 2.87mm RoundDrive Ring Shank Nail For fixing CLD Structural Cavity Battens to the framing. Paslode: (09) 477 3000
	Bostik Seal N Flex-1 'Seal N Flex-1' Polyurethane adhesive sealant manufactured by BOSTIK for applying between the panels and battens, Refer to section 5 for more information. BOSTIK: ALK: (09) 579 6253, WGTN: (04) 567 5119, CHCH: (03) 366 2583.
	Sika Sikaflex 11FC Sika: 0800 SIKAZ (0800 745 269)
	200mm wide Polypropylene DPC Product used over flexible underlay at external and internal corners. ie. Super Course 500

14 Details

The following generic details have been provided in this document for both direct fixed and cavity construction methods.

Table 10

Details				
Description	Direct Fixed		CLD Structural Cavity Batten Construction	
	Figure No.	Page No.	Figure No.	Page No.
Typical framing setout	Figure 1	16	Figure 15	25
Typical panel nail fixing setout	Figure 2	17	Figure 17	27
	Figure 13	24		
Foundation detail	Figure 3	18	Figure 18	28
Vertical shiplap joint	Figure 4	18	Figure 19	29
	Figure 14	25		
Soffit detail	Figure 5	19	Figure 32	39
Internal corner detail	Figure 6	19	Figure 21	30
External corner detail	Figure 7	20	Figure 22	31
Section at sill	Figure 8	20	Figure 24	33
Window jamb	Figure 9	21	Figure 25	34
Window head	Figure 10	21	Figure 26	34
Window head with facings			Figure 27	35
Window jamb with facings			Figure 28	35
Window sill with planted sill			Figure 29	36
Horizontal joint detail	Figure 11	22	Figure 30	37
			Figure 31	38
Corner at 'h' mould joint detail	Figure 12	23		
Batten fixing setout			Figure 16	26
Intermediate stud fixing			Figure 20	30
Jointing of CLD Structural Cavity Batten			Figure 23	32
External corner			Figure 33	40
Cavity pipe penetration			Figure 34	40
Internal corner			Figure 35	41
Aluminium 'h' mould joiner			Figure 36	42
One piece apron flashing joint			Figure 37	43
Drained flashing joint at floor joist			Figure 38	44
Meter box at sill			Figure 39	45
Meter box at jamb			Figure 40	45
Meter box at head			Figure 41	46
Garage door jamb			Figure 42	47
Garage door head			Figure 43	48
Junction between Axon Panel and fascia board			Figure 44	49
Enclosed roof to wall intersection			Figure 45	50

Figure 16: Batten fixing setout

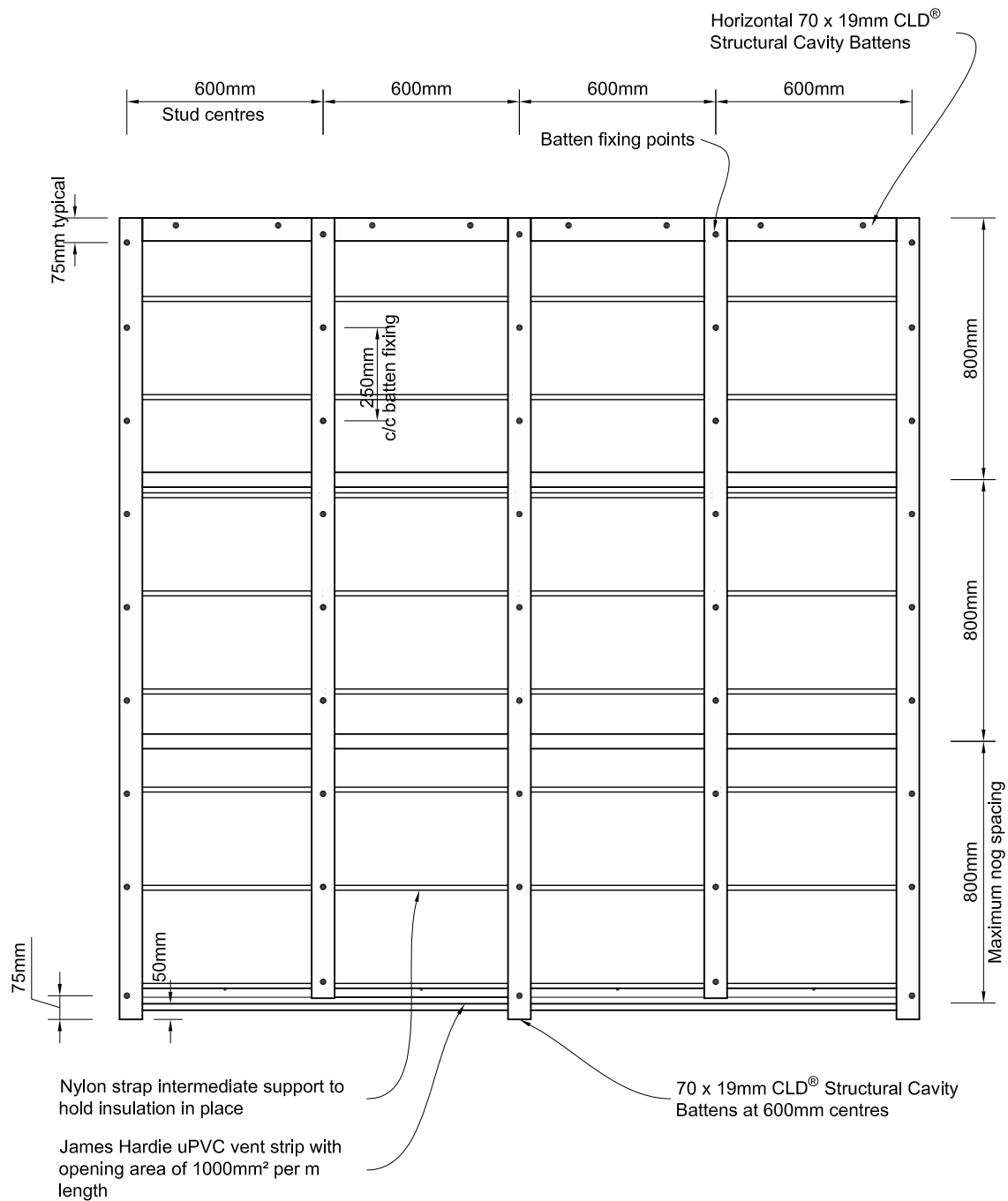
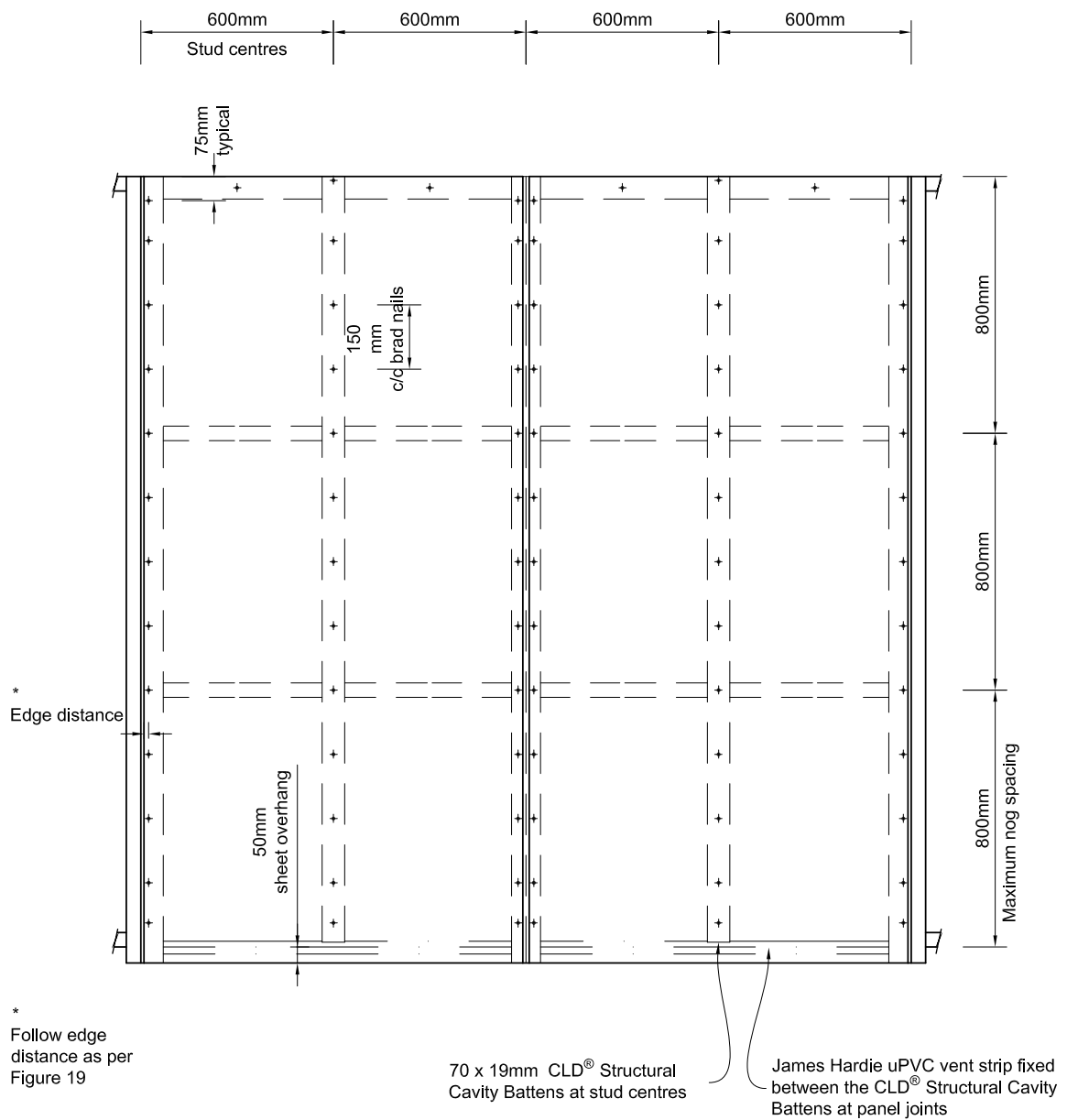
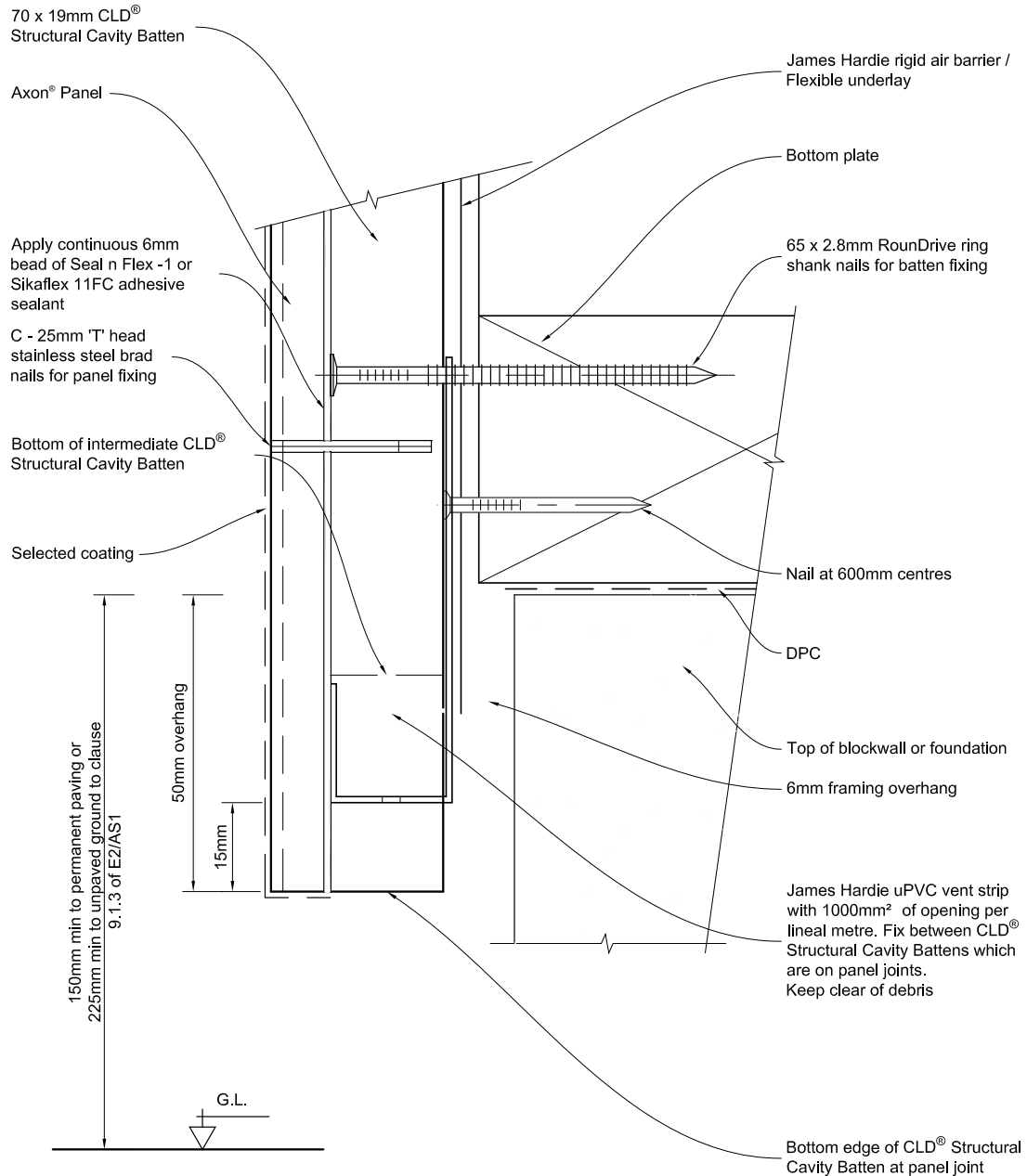


Figure 17: Sheet fixing setout



Note: When studs spaced at 400mm centres using Axon® Panel 400, the nail fixings to intermediate studs to be offset 5mm from the groove in Panel.

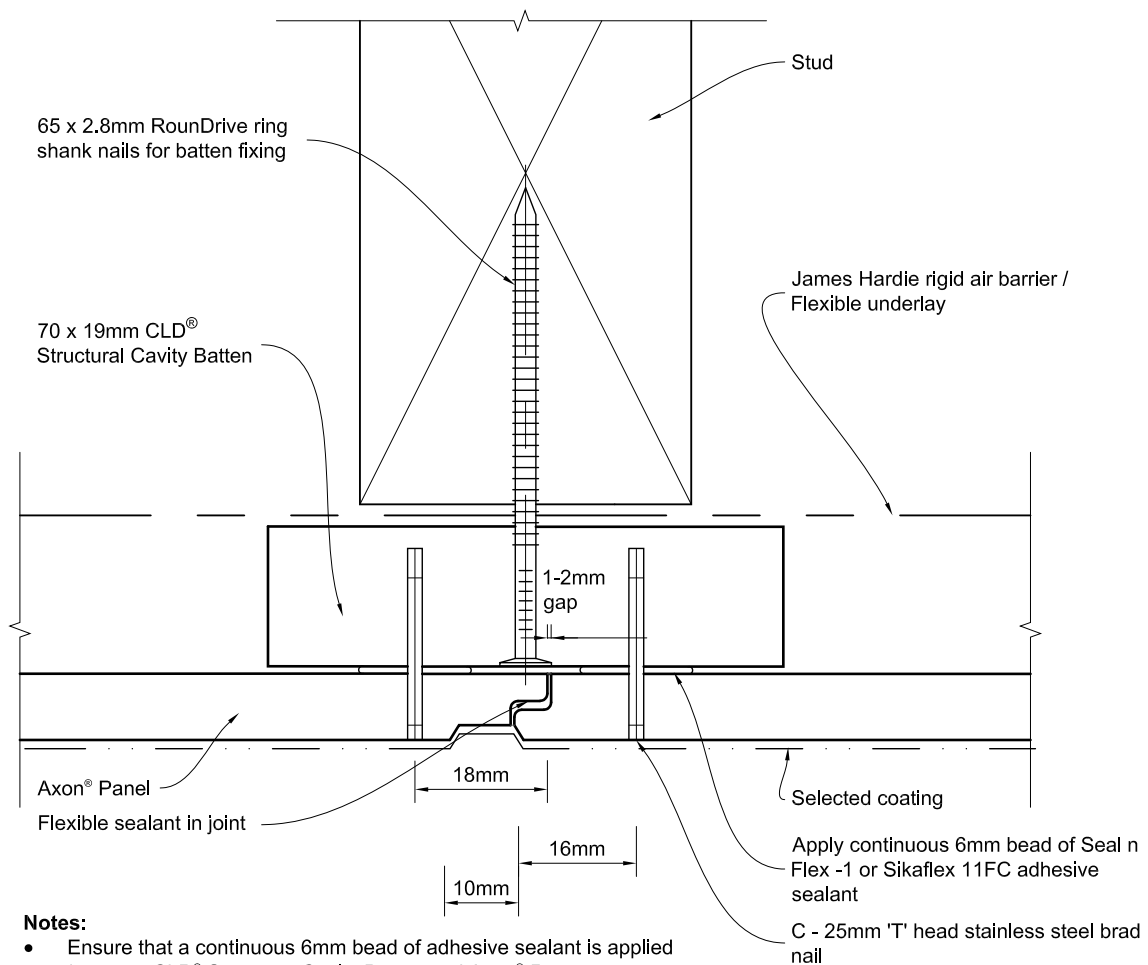
Figure 18: Foundation detail

**Notes:**

- Check panel extends past bottom plate as specified in Architects specification (50mm min).
- uPVC Vent strip must remain level and secure during construction. Cut and fix uPVC vent strip between CLD[®] Structural Cavity Battens fixed under the panel joints.
- Check vent strip is free from site debris.

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Figure 19: Vertical shiplap joint



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Figure 20: Intermediate stud fixing

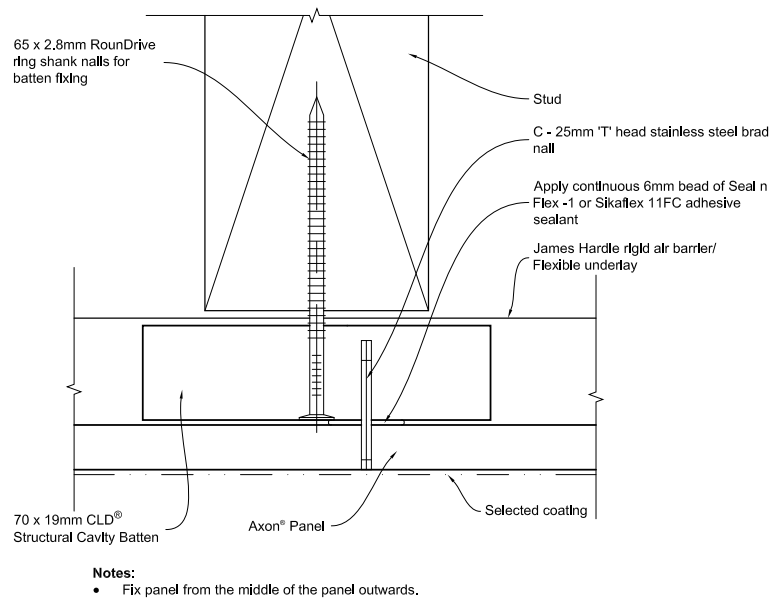
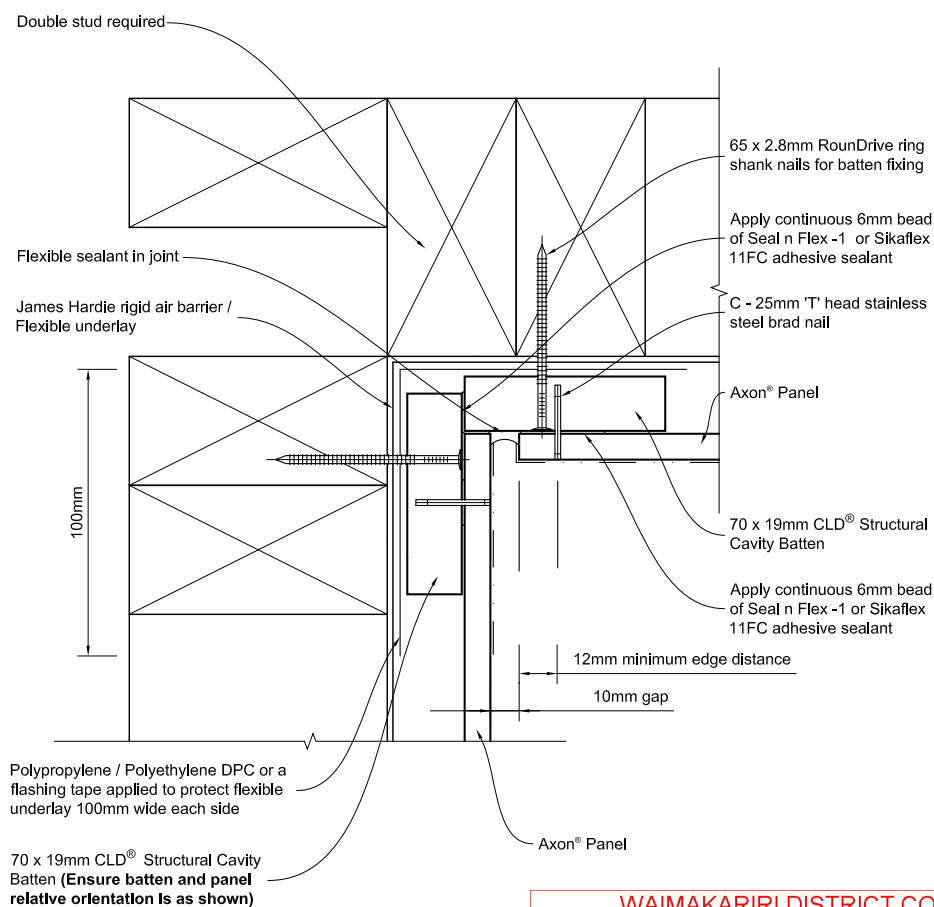
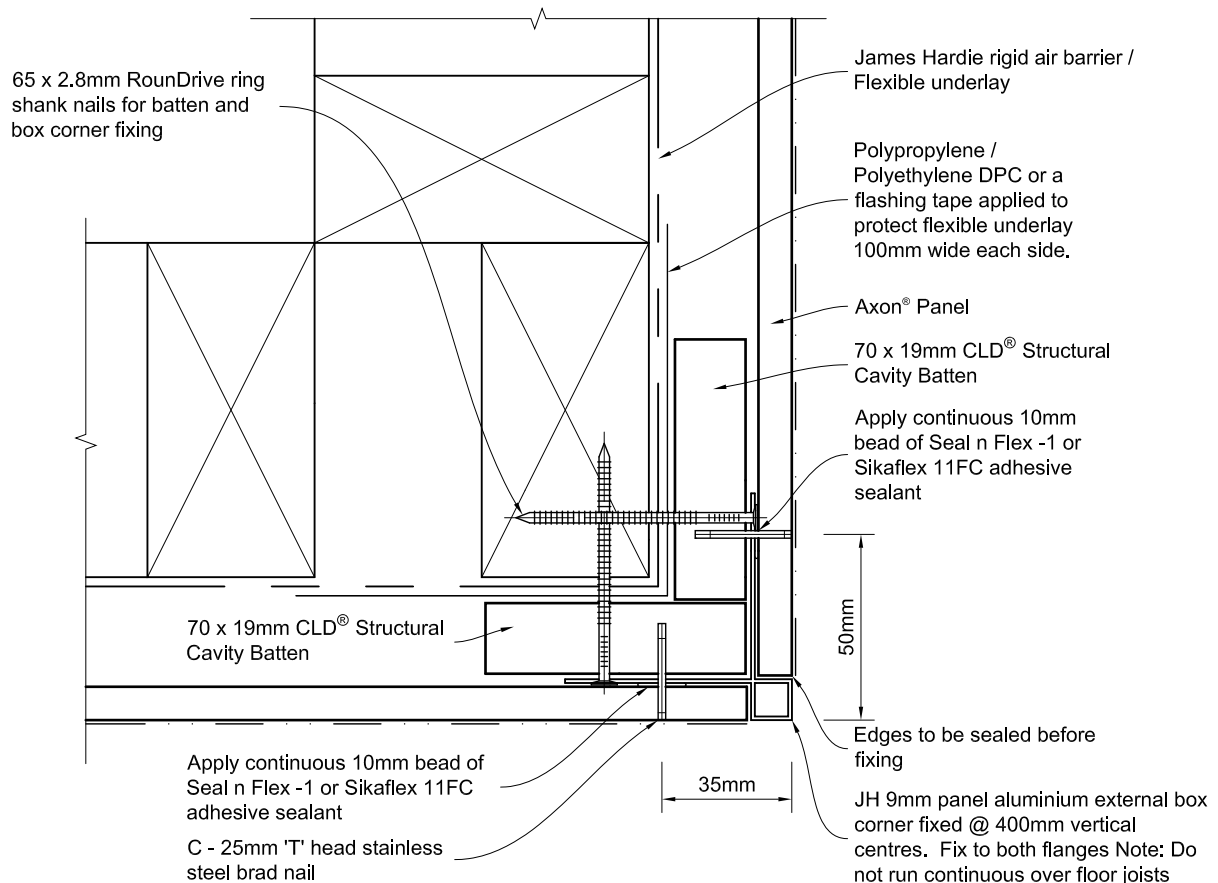


Figure 21: Internal corner



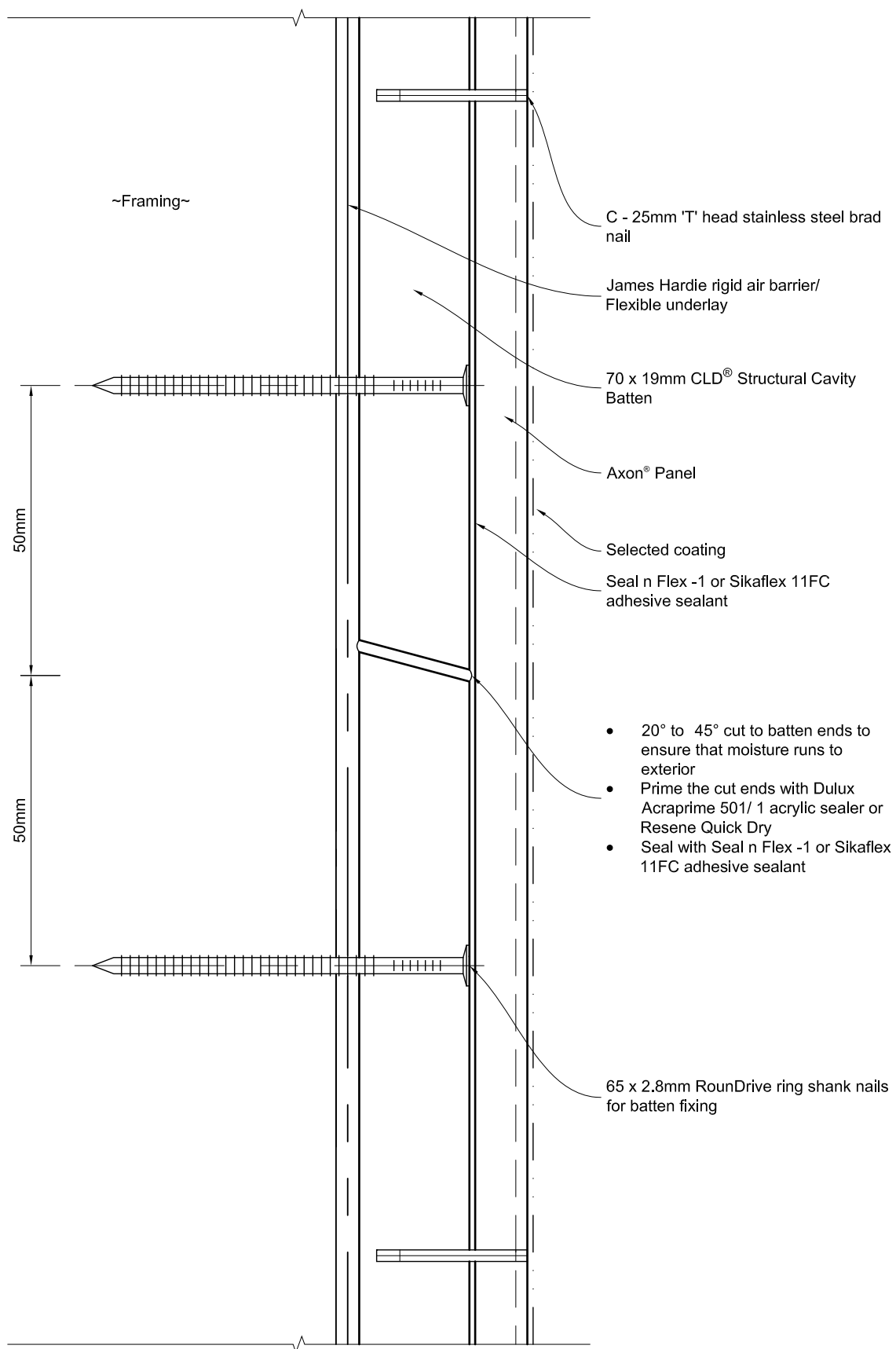
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Figure 22: External corner



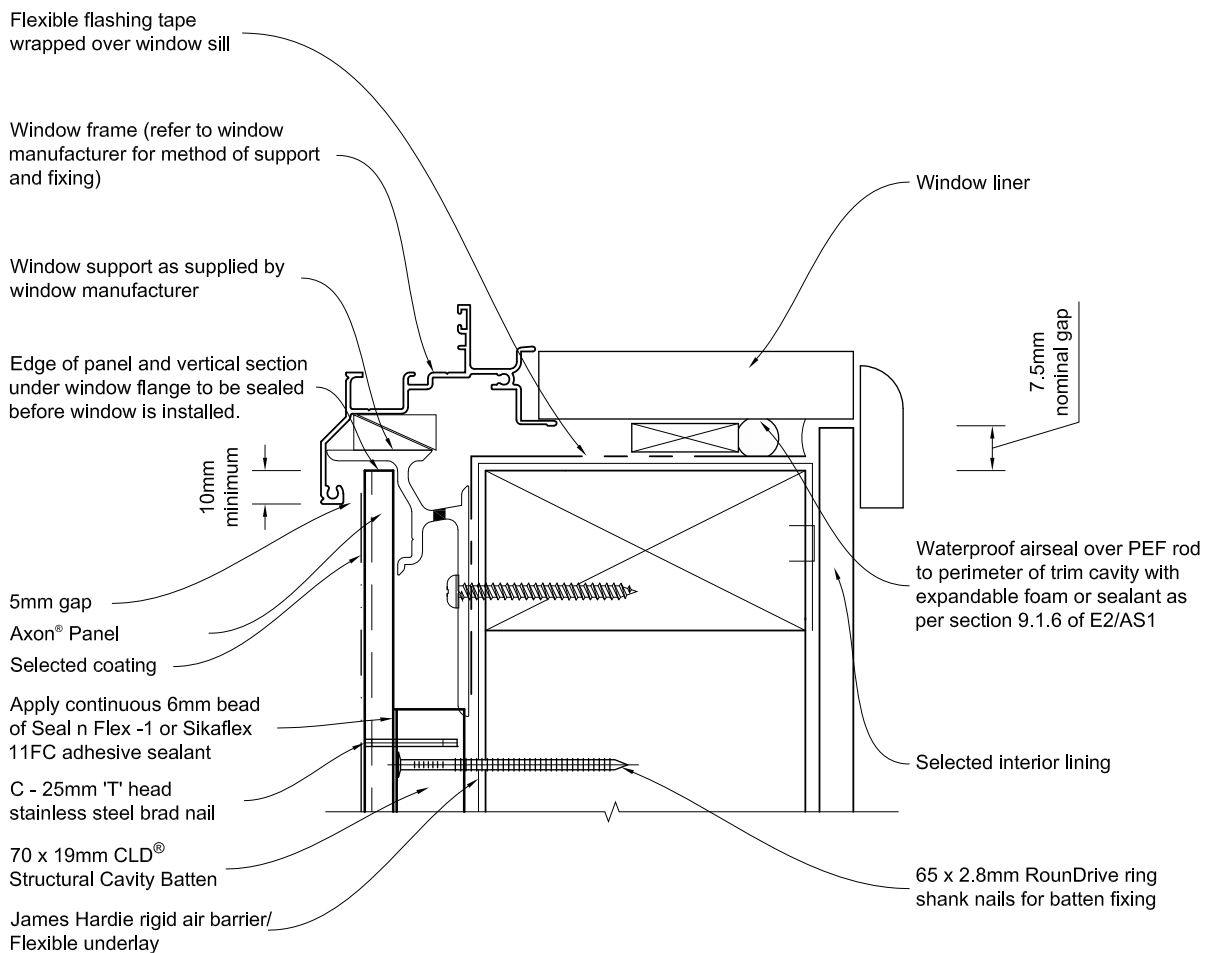
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Figure 23: Jointing of CLD Structural Cavity Batten



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Figure 24: Window sill

**General notes for materials selection**

1. Flashing materials must be selected based on environmental exposure, refer to NZS 3604 and Table 20 of NZBC E2/AS1.
2. Flexible underlay must comply with acceptable solution E2/AS.
3. Flashing tape must have proven compatibility with the selected flexible underlay and other materials with which it comes into contact.

Refer to the manufacturer or supplier for technical information for these materials.

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Figure 25: Window jamb

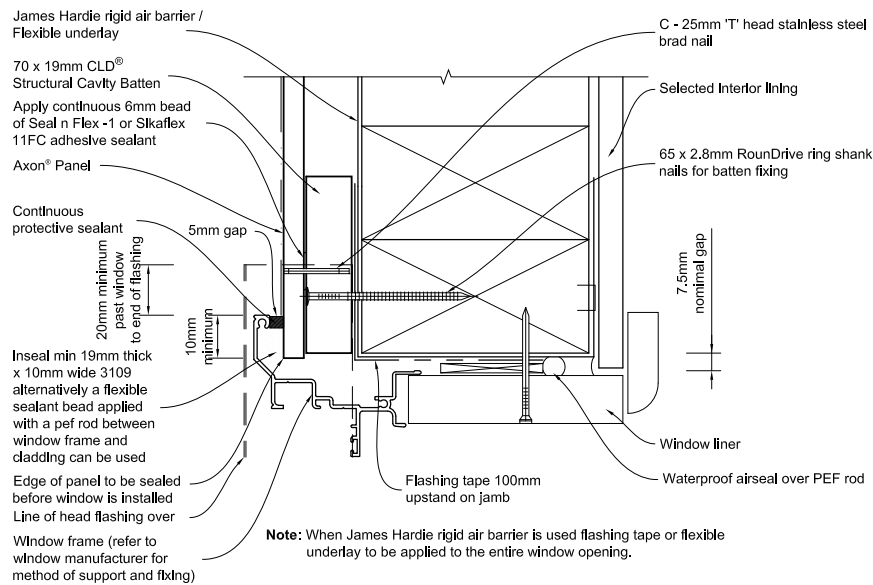
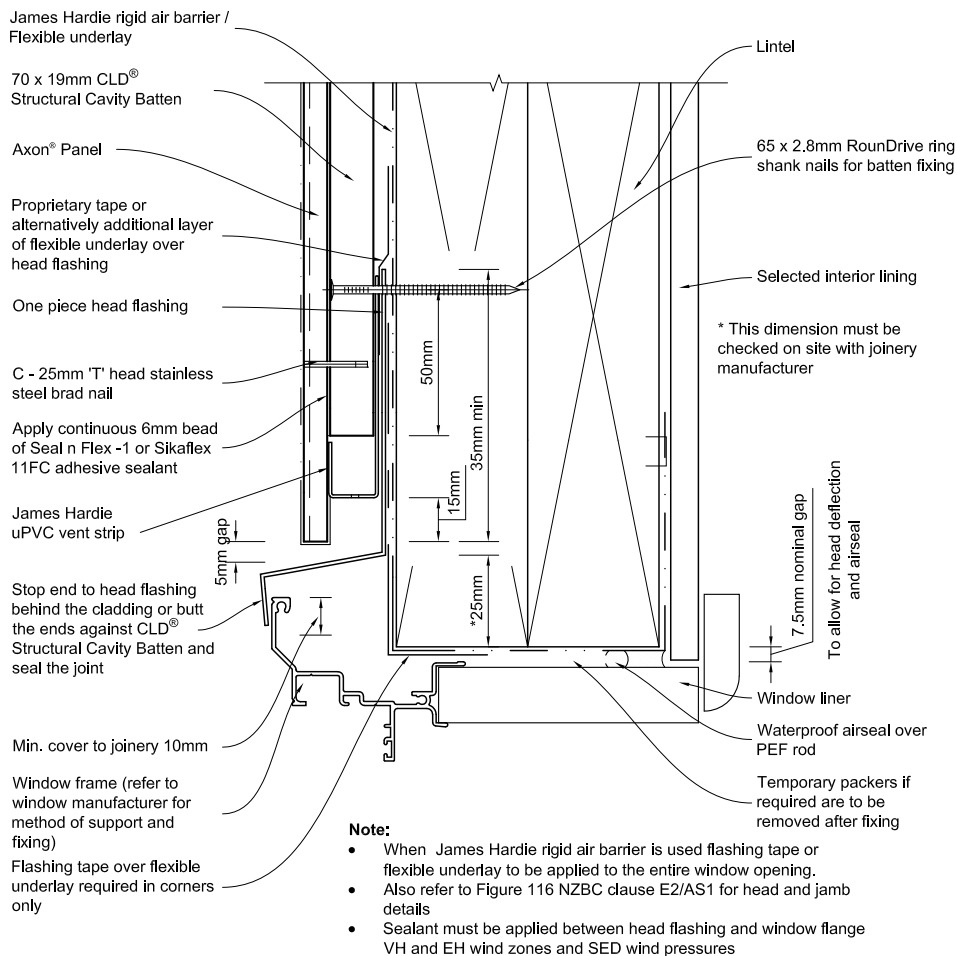
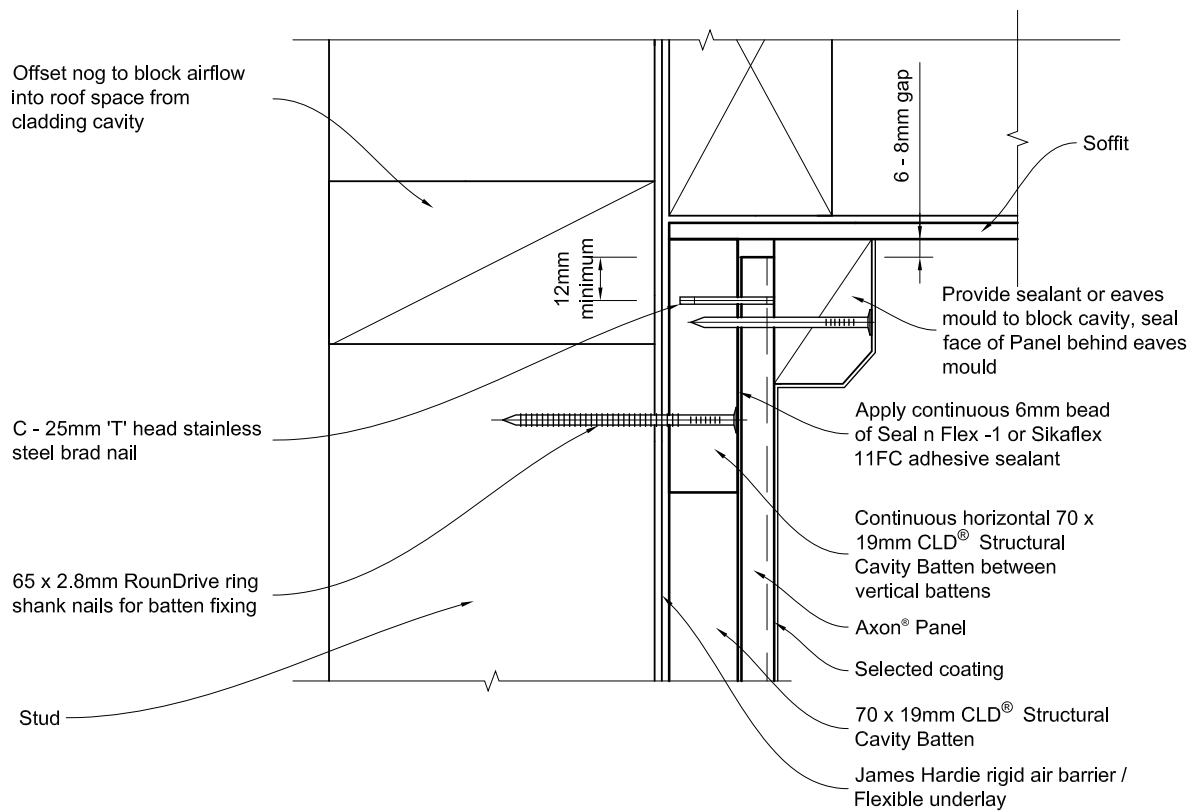


Figure 26: Window head



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Figure 32: Soffit detail



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Notes

Product Warranty

Axon[®]
PANEL

March 2017

James Hardie New Zealand ("James Hardie") warrants for a period of 15 years from the date of purchase that the Axon[®] Panel and CLD Structural Cavity Battens (the "Product"), will be free from defects due to defective factory workmanship or materials and, subject to compliance with the conditions below, will be resistant to cracking, rotting, fire and damage from termite attacks to the extent set out in James Hardie's relevant published literature current at the time of installation. James Hardie warrants for a period of 15 years from the date of purchase that the accessories supplied by James Hardie will be free from defects due to defective factory workmanship or materials.

Nothing in this document shall exclude or modify any legal rights a customer may have under the Consumer Guarantees Act or otherwise which cannot be excluded or modified at law.

CONDITIONS OF WARRANTY:

The warranty is strictly subject to the following conditions:

- a) James Hardie will not be liable for breach of warranty unless the claimant provides proof of purchase and makes a written claim either within 30 days after the defect would have become reasonably apparent or, if the defect was reasonably apparent prior to installation, then the claim must be made prior to installation.
- b) This warranty is not transferable.
- c) The Product must be installed and maintained strictly in accordance with the relevant James Hardie literature current at the time of installation and must be installed in conjunction with the components or products specified in the literature. Further, all other products, including coating and jointing systems, applied to or used in conjunction with the Product must be applied or installed and maintained strictly in accordance with the relevant manufacturer's instructions and good trade practice.
- d) The project must be designed and constructed in strict compliance with all relevant provisions of the current New Zealand Building Code ("NZBC"), regulations and standards.
- e) The claimant's sole remedy for breach of warranty is (at James Hardie's option) that James Hardie will either supply replacement product, rectify the affected product or pay for the cost of the replacement or rectification of the affected product.
- f) James Hardie will not be liable for any losses or damages (whether direct or indirect) including property damage or personal injury, consequential loss, economic loss or loss of profits, arising in contract or negligence or howsoever arising. Without limiting the foregoing James Hardie will not be liable for any claims, damages or defects arising from or in any way attributable to poor workmanship, poor design or detailing, settlement or structural movement and/or movement of materials to which the Product is attached, incorrect design of the structure, acts of God including but not limited to earthquakes, cyclones, floods or other severe weather conditions or unusual climatic conditions, efflorescence or performance of paint/coatings applied to the Product, normal wear and tear, growth of mould, mildew, fungi, bacteria, or any organism on any Product surface or Product (whether on the exposed or unexposed surfaces).
- g) All warranties, conditions, liabilities and obligations other than those specified in this warranty are excluded to the fullest extent allowed by law.
- h) If meeting a claim under this warranty involves re-coating of Products, there may be slight colour differences between the original and replacement Products due to the effects of weathering and variations in materials over time.

Disclaimer: The recommendations in James Hardie's literature are based on good building practice, but are not an exhaustive statement of all relevant information and are subject to conditions (c), (d), (f) and (g) above. James Hardie has tested/assessed the performance of the Axon[®] Panel when installed in accordance with the Axon[®] Panel technical specification, in accordance with the standards and verification methods required by the NZBC and those test results demonstrate the product complies with the performance criteria established by the NZBC. However, as the successful performance of the relevant system depends on numerous factors outside the control of James Hardie (e.g. quality of workmanship and design) James Hardie shall not be liable for the recommendations made in its literature and the performance of the relevant system, including its suitability for any purpose or ability to satisfy the relevant provisions of the NZBC, regulations and standards, as it is the responsibility of the building designer to ensure that the details and recommendations provided in the relevant James Hardie installation manual are suitable for the intended project and that specific design is conducted where appropriate.

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