



WAIMAKARIRI
DISTRICT COUNCIL

Consent Issued BC160644

BC No: 160644

SITE DETAILS:

112 Rangiora Woodend Road

WOODEND

LEGAL:

LOT 4 DP 70132

**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

DWELLING & OTHER WORKS - NOT COMMERCIAL

SECTION 1

*Please Process
on House*

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

Stephen G Clegg, Gayleen R Clegg 42 MacDonalds Lane RD 3 Rangiora 7473	No.	BC160644
	Issue date	24 June 2016
	Overseer	Brenda McIndoe

Project

Description	1100 New (& prebuilt) House, Unit, Bach, Crib, Town Houses BC - New or Relocated Dwelling, New Detached Dwelling
Intended Life	Indefinite (50+)
Intended Use	Residential
Estimated Value	\$203000.00
Location	112 Rangiora Woodend Road WAIMAKARIRI DISTRICT
Legal Description	LOT 4 DP 70132 0.090000 Ha
Valuation No.	2161316100

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.

Compacted Hardfill Pre-DPM (CH) Building Location Certificate required Engineer to also inspect: Foundation Excavation
Foundation & Floor Slab (Pre-Pour Single Pour) (FSL) Engineer to also inspect: Pre-pour Concrete
Structure Pre-Roof Pre-Wrap (SPBW) As Built Truss Approval required
Building Wrap & Sill Tape (BWF)
Mid-Height Veneer (MHV) 70 series brick veneer
Drains (D) Connect to laterals from ROW/easement
Preline & Plumbing (PRP)
Pre-Stopping (PS)
FINAL (FIN) Documents required prior to CCC issue: Building Location Certificate, PS4 - Engineer, Electrical Certificate, Gas Certificate, Plumbing Pressure Test

Form 5

Building consent BC160644

Section 51, Building Act 2004

The building

Street address of building: 112 Rangiora Woodend Road WAIMAKARIRI DISTRICT

Legal description of land where building is located: LOT 4 DP 70132 0.090000 Ha

Valuation number: 2161316100

Building name:

Location of building within site/block number:

Level/unit number: 1

The owner

Name of owner: Stephen G Clegg and Gayleen R Clegg

Contact person:

Mailing address: 42 MacDonalds Lane RD 3 Rangiora 7473

Street address/registered office:

Phone number: Landline:

Mobile: 0276033719

Daytime:

After hours:

Facsimile number:

Email address: gayleenc@gmail.com

Website:

First point of contact for communications with the council/building consent authority:
Stephen George Clegg

Building work

The following building work is authorised by this building consent:

DWELLING WITH ATTACHED GARAGE 112 RANGIORA WOODEND ROAD WOODEND LOT 4 DP 70132
RC155046 / RC155047

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:

All inspections listed must be requested. It is advisable to give at least 48 Hours Notice. Please note that the consent fees allow for a single inspection of construction stages of the project as specified in the inspection schedule. Any extra inspections required will be invoiced and must be paid for before a code compliance certificate is issued. Inspections shall be carried out in accordance with the attached schedule of inspection types. It is the owner's responsibility to ensure all necessary inspections are carried out as required. Please contact the building consent authority if you are unsure what requires inspection - do not cover or enclose any building work without inspection.

Critical Siting: The owner/applicant/agent will need to supply a Building Location Certificate for this Lot prior to the first inspection being booked. The certificate shall confirm that the building is wholly contained within the Lot/s to which it relates and meets the District Plan requirements as Section 223 of the RMA has not been approved.

Comply with the endorsements on the plan.

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

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

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

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.

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.

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

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

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.

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

Under Section 364 of the Building Act 2004, a residential property developer commits an offence if the residential property developer does either or both of the following things before a Code Compliance Certificate is issued in relation to a household unit: (a) completes a sale of the household unit. (b) allows a purchaser of the household unit to enter into possession of the household unit. Note: This does not apply if the residential property developer and the purchaser of the household unit enter into a written agreement, in the prescribed form, for one or both of the above items.

CRITICAL - Consent has been granted subject to Section 37 of the Building Act 2004. A variation to RC155046 & 47 has been applied for but not approved. Building work cannot proceed until either the Building Consent has been amended to comply with the District or Regional Plan or Resource Consent is granted. It is also possible that any Resource Consent approval may contain conditions that affect this Building Consent and require alterations or amendments to be made.

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

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

The gas certificate shall be provided to the building consent authority 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



On behalf of: Waimakariri District Council
Date: 24 June 2016

Form 6

Application for code compliance certificate

Section 92, Building Act 2004

The building consent

Building consent number: BC160644

Issued by: Waimakariri District Council

Valuation number: 2161316100

*The owner

Name of owner: Stephen G Clegg and Gayleen R Clegg

[†]Contact person:

Mailing address: 42 MacDonalds Lane RD 3 Rangiora 7473

Street address/registered office:

Phone number: Landline:

Mobile: 0276033719

Daytime:

After hours:

Facsimile number:

Email address: gayleenc@gmail.com

Website:

The following evidence of ownership is attached to this application:

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: 42 MacDonalds Lane RD 3 Rangiora 7473

174 Rangiora Woodend Road RD 1 Kaiapoi 7691

Signature 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

[¶]Evidence that specified systems are capable of performing to the performance standards set out in the building consent

*Delete this section if details have not changed from the building consent.

[†]Delete if owner is an individual.

^{||}Contact details must be in New Zealand.

[¶]Delete items not applicable.



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:



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

**BUILDING CONSENT AND/OR PIM APPLICATION
FOR DWELLINGS & OTHER WORK THAT DOES NOT FIT THE
CRITERIA FOR SPECIFIED MINOR WORKS FIXED FEE
NOT FOR COMMERCIAL PROJECTS**

Under The Building Act 2004, Sections 33, 45 & Schedule 1, Part 1,
Section 2, BAA13

BC No. BC160644

THE BUILDING

1. Site address: 112 Rangiora Woodend Rd Woodend nth Cant
(Street / Road / Township)
2. Legal description of the land where the building is located:
Lot: 4 DP: 70132 Valuation Number: 2161316100
3. Building Name (if applicable):
4. Location of building within site:
(Only applicable to multi-development sites)
5. Number of levels: 1
6. Unit/Level No.:
7. Floor area m² - Existing: New: 156.49 Total: 156.49
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: Stephen George Clegg & Gayleen Ruth Clegg
(Company or organisation name if applicable)
11. Contact person: Steve Clegg
12. Mailing address: 42 Mac Donalds Ln R.D.3. Rangiora. 7473
13. Street address / Registered office: A Ahan
14. Mobile: 0276033719 Landline: Email: gayleenc@gmail.com
15. The following evidence of ownership is attached to this application:
☒ Copy of Certificate of Title OR ☒ Council to provide (additional charge of \$10.20)
 (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:

- ☐ Project Information Memorandum (PIM) only ☐ Building Consent for PIM No:
☐ Building Consent with PIM ☒ Building Consent without PIM (Planning Check applies)
☐ Exemption from the need for B/C ☐ Amendment to Building Consent
 (Refer Schedule 1, Part 1, Section 2, BAA13)

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: S G. Cleop

Mailing address: 42 Mac Donalds Ln. R.D.3. Rangiora 7473

Mobile: 0276033719 Landline: Email: gayleenc@gmail.com

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

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

New Dwelling, attached garage.
Gas hot water.

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

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) \$ 203,000

(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

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

Resource Consent

RC 155046 RC 155047/160406030247

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).

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)
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- ☐ B1 Structure
- ☐ B2 Durability
- ☐ C1 - C6 Protection from fire
- ☐ D1 Access routes
- ☐ D2 Mechanical installations for access
- ☐ E1 Surface water
- ☐ E2 External moisture
- ☐ E3 Internal moisture
- ☐ F1 Hazardous agents on site
- ☐ F2 Hazardous building materials
- ☐ F3 Hazardous substances and processes
- ☐ F4 Safety from falling
- ☐ F5 Construction and demolition hazards
- ☐ F6 Visibility in escape routes
- ☐ F7 Warning systems
- ☐ F8 Signs
- ☐ G1 Personal hygiene
- ☐ G2 Laundering
- ☐ G3 Food preparation and prevention of contamination
- ☐ G4 Ventilation
- ☐ G5 Interior environment
- ☐ G6 Airborne and impact sound
- ☐ G7 Natural light
- ☐ G8 Artificial light
- ☐ G9 Electricity
- ☐ G10 Piped services
- ☐ G11 Gas as an energy source
- ☐ G12 Water supplies
- ☐ G13 Foul water
- ☐ G14 Industrial liquid waste
- ☐ G15 Solid waste
- ☐ H1 Energy efficiency

Refer sheet in specs

COMPLIANCE SCHEDULE

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)
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FOUNDATIONS

Millbrook Building LTD 130573

CARPENTRY

Millbrook Building LTD 130573

EXTERIOR PLASTERER

BRICKLAYER

BLOCKLAYER

ROOFER

KEY PERSONNEL**BUILDER**

Name: Joseph Simon Clegg Reg. No.: 130573
Address: 42 Mac Donalds Ln R.D.3 Rangiora 7473
Phone No.: 027 3073335 Fax No.:
Email: gayleenc @ gmail.com

DESIGNER(S)

Name: Wayne Worrall Reg. No.: 116177
Address: 18A Rata St. Rangiora
Phone No.: 03 313 3744 Fax No.:
Email: Sharon.Waynew @ xtra.co.nz

CERTIFYING DRAINLAYER

Name: Reg. No.:
Address: Fax No.:
Phone No.:
Email:

CERTIFYING PLUMBER

Name: Reg. No.:
Address: Fax No.:
Phone No.:
Email:

CERTIFYING GASFITTER

Name: Reg. No.:
Address: Fax No.:
Phone No.:
Email:

REGISTERED ELECTRICIAN

Name: Reg. No.:
Address: Fax No.:
Phone No.:
Email:

STRUCTURAL ENGINEER

Name: Nicholas Calvert/Kirk Roberts Engineers Reg. No.: 242062
Address: Level 1 337 St Asaph St. P.O. Box 35-320 Christchurch
Phone No.: (03) 379 8600 Fax No.:
Email: www.kirkroberts.co.nz

OWNER / AGENT AUTHORISATION

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

Name:

Stephen Clegg

Date:

13-5-16.

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)

- ☒ 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

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



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

- Request to process in house with 3 other consents
Submitted (Each to have own BC #).

Date of acceptance: 13.5.16

Officer:

Karen Johnson

OFFICE USE ONLY

Fee paid on application: \$ 1635 -

Date:

Officer:

Date payment processed:

Receipt

Officer:

23/05/2016 DC Shirley Cresswell

IMPORTANT INFORMATION

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 03 311 8900 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.

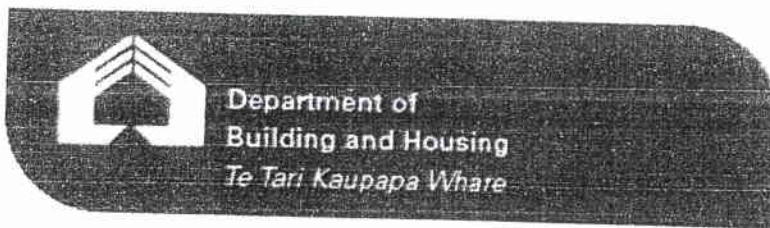
The Agent will be the first point of contact for all communications with the Council/Building Consent Authority regarding this application under Sections 33 and 45 and if authorised, the application for a Code Compliance Certificate under Section 92 of the Building Act 2004. They will receive all correspondence and must be authorised by the Owner - see page 7. All amendments require new authorisation.

Application for project information memorandum and/or building consent

The building work will comply with the building code as follows:
 [if you're not sure which clauses are applicable, talk to the BCA or your architect]

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]
☒ B1 Structure	B1/AS1, NZS 3604	
☒ B2 Durability	B2/AS1, NZS 3604	
☒ C1 Outbreak of fire	C1/AS1 Pt 2	
☒ C2 Means of escape	C2/AS1 Pt 3	
☐ C3 Spread of fire	NA	
☐ C4 Structural stability during fire	NA	
☒ D1 Access routes	D1/AS1	
☐ D2 Mechanical installations for access	NA	
☒ E1 Surface water	E1/AS1	
☒ E2 External moisture	E2/AS1, NZS 3604	
☒ E3 Internal moisture	E3/AS1 (Gib wet areas manual)	
☐ F1 Hazardous agents on site	NA	
☒ F2 Hazardous building materials	F2/AS1 NZS 4223 Pt 3	
☐ F3 Hazardous substances and processes	NA	
☐ F4 Safety from falling	NA	
☐ F5 Construction and demolition hazards	F5/AS1	
☐ F6 Lighting for emergency	NA	
☒ F7 Warning systems	F7/AS1	
☐ F8 Signs	NA	
☒ G1 Personal hygiene	G1/AS1	
☒ G2 Laundering	G2/AS1	
☒ G3 Food preparation and prevention of contamination	G3/AS1	
☒ G4 Ventilation	G4/AS1	
☐ G5 Interior environment	G5/AS1	
☐ G6 Airborne and impact sound	NA	
☒ G7 Natural light	G7/AS1	
☒ G8 Artificial light	G8/AS1	
☒ G9 Electricity	G9/AS1	
☒ G10 Piped services	G10/AS1	
☒ G11 Gas as an energy source		
☒ G12 Water supplies	G12/AS1	
☒ G13 Foul water	G13/AS1 ; AS2	
☐ G14 Industrial liquid waste	NA	
☐ G15 Solid waste	NA	
☒ H1 Energy efficiency	H1/AS1 NZS 4218	

All the relevant information on this form is required to be provided under the Building Act and Resource Management Act for the Environmental Services Unit to process your application. Under these Acts this information has to be made available to members of the public. 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.



Licensed Building Practitioner Details

Wayne Worrall - Licensed Building Practitioner

Building practitioner number BP116177

Phone number 03 313 3744

Fax number

Email address sharon.waynew@xtra.co.nz

Location 18A RATA ST. RANGIORA

Location Rangiora 7400

Licence Classes

Licence class	Status of Licence	Status reason	Date granted
<u>Design</u>	Approved	Active	15 Jun 2012

- Areas of practice
Design 1

Information about any person in the register of licensed building practitioners is held, maintained and may be viewed in accordance with the Building Act 2004 and the Privacy Act 1993.

Form 2A

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

The building

Street address of building:

RANGIORA/WOODEND RD
 Lot 4

The owner

Name:

Address:

Telephone number:

Email address:

Identification of design work that is restricted building work

I carried out or supervised the following design work that is restricted building work:

Design work that is restricted building work	Description	Carried out/ supervised	Reference to plans and specifications
<i>[Tick]</i>	<i>[If appropriate, provide details of the restricted building work]</i>	<i>[Specify whether you carried out this design work or supervised someone else carrying out this design work]</i>	<i>[If appropriate, specify references]</i>
Primary structure			
Foundations and subfloor framing	☒	☐ Carried out ☒ Supervised	engineered
Walls	☒	☒ Carried out ☐ Supervised	
Roof	☒	☐ Carried out ☒ Supervised	truss designer
Columns and beams	☒	☐ Carried out ☒ Supervised	" "
Bracing	☒	☒ Carried out ☐ Supervised	
Other	☐	☐ Carried out ☐ Supervised	
External moisture management systems			
Damp proofing	☒	☒ Carried out	

Roof cladding or roof cladding system	☒		☐ Supervised ☒ Carried out ☐ Supervised	
Ventilation system (for example, subfloor or cavity)	☐		☐ Carried out ☐ Supervised	
Wall cladding or wall cladding system	☒		☒ Carried out ☐ Supervised	
Waterproofing	☒		☒ Carried out ☐ Supervised	
Other	☐		☐ Carried out ☐ Supervised	

Fire safety systems

Emergency warning systems, evacuation and fire service operation systems, suppression or control systems, or other	☒		☒ Carried out ☐ Supervised	Smoke alarms
--	-------------------------------------	--	--	--------------

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.

Are waivers or modifications of the building code 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]

Note: continue on another page if necessary.

Issued by

Name:	Wayne Worrall
LBP or registration number:	116177
The practitioner is a:	☒ Design LBP ☐ Registered architect ☐ Chartered professional engineer

Mailing address: _____
Street address or registered office: _____
Phone number: Landline: 03 3133744 Mobile: _____
Daytime: _____ After hours: _____
Fax number: _____
Email address: sharon.waynew@xtra.co.nz
Website: _____

Declaration

I, Wayne Worrall [name of practitioner]

certify that the design work that is restricted building work recorded on this form:

(a) complies with the building code; or

(b) complies with the building code subject to any waiver or modification of the building code recorded on this form.

Signature: Wayne Worrall

Date: 18/3/2016

+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: 112 & 116 Rangiora Woodend Road

Suburb: Woodend

Town/City: Rangiora

Postcode: 7610

THE OWNER

Name(s): Steven and Gayleen Clegg

Mailing address: 42 MacDonalds Lane

Suburb:

PO Box/Private Bag:

Town/City: Rangiora RD3

Postcode: 7473

Phone number: 027 6033719

Email address: gayleenc@gmail.com

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, **Nicholas Calvert** 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	(√)	<i>Rib raft floor design for four separate houses</i>	() Carried out (√) Supervised	
Walls	()		() Carried out () Supervised	
Roof	()		() Carried out () Supervised	
Columns and beams	()		() Carried out () Supervised	
Bracing	()		() Carried out () Supervised	
Other	()		() Carried out () Supervised	

EXTERNAL MOISTURE MANAGEMENT SYSTEMS: E2 – N/A

All RBW design work relating to E2	()		() Carried out () Supervised	
Damp proofing	()		() Carried out () Supervised	
Roof cladding or roof cladding system	()		() Carried out () Supervised	
Ventilation system (for example, subfloor or cavity)	()		() Carried out () Supervised	
Wall cladding or wall cladding system	()		() Carried out () Supervised	
Waterproofing	()		() Carried out () Supervised	
Other	()		() Carried out () Supervised	

FIRE SAFETY SYSTEMS: C1 – C6 – N/A

Emergency warning systems, evacuation and fire service operation systems, suppression or control systems, or other	()		() Carried out () Supervised	
--	-----	--	-----------------------------------	--

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
NA	NA

Note: continue on another page if necessary.

ISSUED BY

Name: Nicholas Calvert	CPEng: 242062
The practitioner is a: () Design LBP () Registered architect (√) Chartered professional engineer	
Design Entity or Company (optional): Kirk Roberts Consulting Engineers	
Mailing address (if different from below):	
Street address / Registered office: Level 2, 337 St. Asaph St.	
Suburb: Central	Town/City: Christchurch
PO Box/Private Bag: 35320	Postcode: 8640
Phone number: 03 379 8600	Mobile: 027 303 5252
After Hours:	Fax: 03 379 8605
Email address: nickm@kirkroberts.co.nz	Website: kirkroberts.co.nz

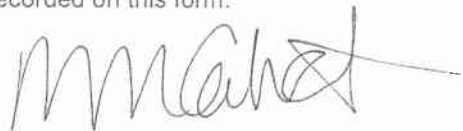
DECLARATION

I Nicholas Calvert CPEng, 242062

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.

Signed:



Date: 8th Dec 2015



COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952

Search Copy



Identifier CB40D/343
Land Registration District Canterbury
Date Issued 10 April 1997

Prior References
CB38A/388

Estate Fee Simple
Area 900 square metres more or less
Legal Description Lot 4 Deposited Plan 70132
Proprietors
Stephen George Clegg and Gayleen Ruth Clegg

Interests

Notice 777195 declaring the State Highway adjoining the within land to be a Limited Access Road - 26.9.1969 at 9.30 am

A170214.1 Mortgage to ASB Bank Limited - 28.4.1995 at 11.48 am

A291322.7 Easement Certificate specifying the following easements - 10.4.1997 at 10.14 am

Type	Servient Tenement	Easement Area	Dominant Tenement	Statutory Restriction
Right of way, right to drain water and sewage and to convey water, electric power and telephonic communications	Lot 2 Deposited Plan 70132 - CT CB40D/341	A DP 70132	Lot 4 Deposited Plan 70132 - herein	
Right of way, right to drain water and sewage and to convey water, electric power and telephonic communications	Lot 3 Deposited Plan 70132 - CT CB40D/342	B DP 70132	Lot 4 Deposited Plan 70132 - herein	
Drain water	Lot 3 Deposited Plan 70132	-	Lot 4 Deposited Plan 70132 - herein	

The easements specified in Easement Certificate A291322.7 when created will be subject to Section 243(a) Resource Management Act 1991

A459629.2 Resolution under Section 243(f)(ii) Resource Management Act 1991 cancelling the easement condition marked C on DP 70132 as is now marked D on DP 82644 - 25.5.2000 at 9.01 am

A459629.4 Transfer surrendering the easement specified in Easement Certificate A291322.7 over part Lot 6 marked D on DP 76832 CT CB44A/970 - 25.5.2000 at 9.01 am

A459629.7 Easement Certificate specifying the following easements - 25.5.2000 at 9.01 am

Type	Servient Tenement	Easement Area	Dominant Tenement	Statutory Restriction
Drain water	Lot 9 Deposited Plan 82644 - CT CB47D/234	I DP 82644	Lot 4 Deposited Plan 70132 - herein	

Identifier CB40D/343

Drain water	Lot 10 Deposited Plan 82644 - CT CB47D/235	J DP 82644	Lot 4 Deposited Plan 70132 - herein
Drain water	Lot 10 Deposited Plan 82644 - CT CB47D/235	K DP 82644	Lot 4 Deposited Plan 70132 - herein
Drain water	Lot 11 Deposited Plan 82644 - CT CB47D/236	M DP 82644	Lot 4 Deposited Plan 70132 - herein
Drain water	Lot 16 Deposited Plan 82644 - CT CB47D/241	L DP 82644	Lot 4 Deposited Plan 70132 - herein

The above easements will be subject to Section 243(a) Resource Management Act 1991 when created
8860029.1 Variation of Mortgage A170214.1 - 12.9.2011 at 9:43 am

SECTION 2

Geotech, Engineer Reports & Conditions PS1 & 2

- **Calculations**
- **A4 Details**

JOB NO: 157027

ISSUE: A

PRODUCER STATEMENT – PS1 – DESIGN

ISSUED BY: KIRK ROBERTS Consulting Engineers Ltd

DESIGN ENGINEER: Nick Macindoe

TO: Steven and Gayleen Clegg

TO BE SUPPLIED TO: Waimakariri District Council

IN RESPECT OF: Foundation Design

AT: 112 & 116 Rangiora Woodend Road,
WOODEND 7610

LOT:

DP:

**Dwelling 4 - Lot 4
Drawings S0, S1d, S2**

We have been engaged by **McMillian Civil Ltd** to provide **Structural Engineering Design and Construction Monitoring** 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 Ministry of Business, Employment and Innovation, **B1/VM1 and B1/VM4** or ☐ Alternative solution as per the attached schedule.

The proposed building work covered by the producer statement is described on **Kirk Roberts Consulting Engineer Ltd's** drawings titled "**Foundation Design at 112 & 116 Rangiora Woodend Road**" and numbered **157027 S0, S1a, S1b, S1c, S1d, S2 (all Rev 1)** together with the specification, and other documents set out in the schedule attached to this statement.

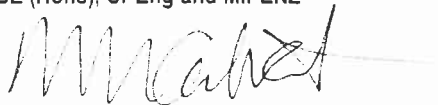
On behalf of **Kirk Roberts Consulting Engineers Ltd**, and subject to:

- (i) Site verification of the following design assumptions: **none**
- (ii) Geotechnical ultimate bearing capacity of at least 300 kPa in accordance with accordance with Kirk Robert's Ltd report dated 17 November 2015
- (iii) **Unless specifically noted, compliance of the drawings to Non Specific codes such as NZS 3604 and NZS 4229 have not been checked by this practice**
- (iv) **This certificate does not cover weather-tightness**
- (v) **Required Inspections as shown on the reverse**
- (vi) **This Producer Statement - Design is valid for a building consent issued within 1 year from the date of issue**
- (vii) All proprietary products meeting their performance specification requirements.

I believe on reasonable grounds the foundation, 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

Kirk Roberts Consulting Engineers Ltd holds a current policy of Professional Indemnity Insurance no less than \$200,000*, and is a member of ACENZ ☒ Yes ☐ No

I, **Nicholas Calvert** am CPEng 242062 I am a Member of IPENZ and hold the following qualifications
BE (Hons), CPEng and MIPENZ

**Nicholas Calvert**Signed on behalf of **KIRK ROBERTS CONSULTING ENGINEERS LTD**

Date 8 December 2015

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

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

Original To: Steven and Gayleen Clegg
42 MacDonald's Lane
Rangiora RD3
Postcode 7473

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications **APPROVED** in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
BC160644 24/06/2016 brendam

SCHEDULE OF INSPECTIONS

Engineering inspections relating to compliance with the appropriate New Zealand materials standards and for verification of design assumptions are required as follows:-

i)

	TIME	NO. OF INSPECTIONS
1.	Foundation Excavation	1
2.	Pre pour	1

Please note the above table is a brief schedule of inspection for this project. Please refer to Appendix C of the Structural Specification for the full schedule of engineers inspections for this project.

ii) Structural observation of construction will be carried out in accordance with IPENZ, Construction Monitoring Services (CM3).

CM3 Review, to the extent agreed with the client, including random samples of important work procedures, for compliance with the requirements of the drawings and specifications. To review important completed work prior to enclosure or as appropriate. Be available to provide the constructor with technical interpretation of the drawings and specifications.

Refer Section 7 - Appendix A for the full Specification and Schedule of site observations required on this site.

As a Council Requirement a **Producer Statement – PS4 – Construction Review** will be required to be issued for the projects **Code Compliance Certificate**. This can only be issued if the above inspections have been carried out.

It's the Owners responsibility to notify the Engineer to enable the above inspections to be carried out. The Engineer requires notification a minimum of **48 hours** before the required inspections within the Christchurch City Limits and a Minimum of **3 days** before any observations outside the Christchurch City limits.

Consent Issued BC160644

BC160644

JOB NAME: 112 & 116 Rangiora - Woodland Rd. JOB No.: 157027
REASON FOR:
ISSUE: Foundation design. DESIGNER: NDM
DATE: 4th Dec 2015 REVIEWER: AL

DOCUMENTS INCLUDED IN REVIEW

CALCULATIONS	☒ Dated: _____	PS1 OR PS4	☐	SPECIFICATION	☐	_____
STRUCTURAL DRAWINGS	☒ Revision: _____	DESIGN FEATURES	☐	OTHER (SPECIFY)	☐	_____

REVIEW COMMENTS

ITEM	COMMENT	REVIEWER INITIALS AFTER ACTIONED
	Calcs ✓	

The Documents Reviewed have been carried out generally in accordance with the specifications, with the exception to the comments above. The comments should be addressed to the acceptance of the reviewer before the review is considered complete.

REVIEWERS SIGNATURE (IF APPROPRIATE)

REVIEW REQUIRED?

✓	STRUCTURAL REVIEWER SIGNATURE
	GEOTECHNICAL REVIEWER SIGNATURE
	FIRE REVIEWER SIGNATURE
	CIVIL REVIEWER SIGNATURE
	ARCHITECT REVIEWER SIGNATURE
	OTHER REVIEWER SIGNATURE(S)

Date: 8-12-15
Date:
Date:
Date:
Date:
Date:

CALCULATION SHEET

JOB NO: 157027

Consent Issued BC160644

BC160644

JOB NAME:

TITLE:

DESIGN NOTES:

SECTION NO:

SHEET NO: 1

REV:

DATE:

DESIGNER:



Load takeoff

Dead loads

$$\begin{aligned} \text{light domestic roofing} &= 0.46 \text{ kN/m}^2 \\ \text{trib. area (worst)} &= 66.8 \text{ m}^2 \\ \text{total load} &= 30.7 \text{ kN} \\ \text{UDL} &= 1.45 \text{ kN/m} \end{aligned}$$

$$\text{Brick veneer, timber frame} = 5.2 \text{ kN/m}$$

$$\begin{aligned} \text{Found. self weight} &= 25 \text{ kN/m}^3 \\ &= 25 \times 0.3 \times 0.35 \\ \text{UDL} &= 2.63 \text{ kN/m} \end{aligned}$$

$$\text{Total dead load} = 9.28 \text{ kN/m}$$

Live loads

$$\begin{aligned} \text{Imposed roof load} &= 0.5 \text{ kN/m}^2 \\ \text{trib. area (worst)} &= 66.8 \text{ m}^2 \\ \text{total load} &= 33.4 \text{ kN} \\ \text{UDL} &= 1.58 \text{ kN/m} \quad (\text{not for EQ case}) \end{aligned}$$

Snow loads (Refer page 2 for calculations)

$$\begin{aligned} \text{trib. area of roof} &= 66.8 \text{ m}^2 \\ \text{total load} &= 20.0 \text{ kN} \\ \text{UDL} &= 0.95 \text{ kN/m} \end{aligned}$$

Wind loads (ignored)

$$\begin{aligned} G &= 9.28 \text{ kN/m} \\ S &= 1.58 \text{ kN/m} \\ \text{Total} &= 10.86 \text{ kN/m} \end{aligned}$$

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Snow loading:

(Region N4)

$$s = s_g C_e \mu_i$$

$$s_g = k_p 1.2 [3h_o / 1000 + 0.3]$$

$$h_o = 11m \text{ (flood map)}$$

$$k_p = 1.5 \text{ (Table 5.1, pg: 16)}$$

$$s_g = (1.5)(1.2) [3(11m) / 1000 + 0.3]$$

$$= 0.6 \text{ kN/m}^2 < 0.9 \text{ kN/m}^2$$

$$s_g = 0.9 \text{ kN/m}^2$$

$$C_e = 1.0 \text{ (for sub alpine region)}$$

$$\begin{aligned} \mu_i &= 0.7(60 - \alpha) / 50 \\ &= 0.7(60 - 24) / 50 \\ &= 0.504 \end{aligned}$$

$$s = s_g C_e \mu_i$$

$$= (0.9 \text{ kN/m}^2)(1.0)(0.504)$$

$$s = 0.45 \text{ kN/m}^2$$

$$S_u = 0.45 \text{ kN/m}^2 \times 66.8 \text{ m}^2$$

$$= 30 \text{ kN} / 21.12 \text{ m}$$

$$S_u = 1.42 \text{ kN/m}$$



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Load combinations considered

$$Ed_1 = 1.2 G + 1.5 Q$$

$E_w = \text{ignored}$

$$Ed_2 = G + E_w + \psi_e Q$$

$$\psi_e = 0.3$$

$$Ed_3 = 1.2 G + S_u + \psi_e Q$$

$$\psi_e = 0.4$$

$$Ed_1 = 1.2 G + 1.5 Q$$

$$= 1.2(9.28 \text{ kN/m}) + 1.5(1.58 \text{ kN/m})$$

$$= 13.5 \text{ kN/m}$$

$$Ed_2 = G + E_w + \psi_e Q$$

$$= 9.28 \text{ kN/m}$$

$$= 9.3 \text{ kN/m}$$

$$Ed_3 = 1.2 G + S_u + \psi_e Q$$

$$= 1.2(9.28 \text{ kN/m}) + 1.42 \text{ kN/m} + 0.4(1.58 \text{ kN/m})$$

$$= 13.2 \text{ kN/m}$$

Load case Ed_1 governs, therefore perimeter foundation loading is 13.5 kN/m .



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Bearing capacity (continuous footing)

Worst case UDL = 13.5 kN/m.

Footing width = 0.3m

Bearing pressure, $q = \frac{13.5 \text{ kN/m}}{0.3 \text{ m}}$

$q = 45 \text{ kN/m}^2$

Based on Geotechnical report the ultimate bearing capacity (after ground improvement) is 300 kPa

$q_{allow} = 0.6 (300 \text{ kPa})$ (static case)
 $= 180 \text{ kPa}$

$q < q_{allow}$ ✓



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Rib beam design (garage)

Loading

Dead loads

Concrete slab (100mm) = 2.4 kN/m²

~~Partitions (?) = 0.5 kN/m²~~

Total = 2.4 kN/m²

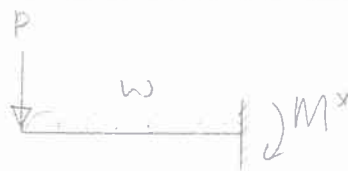
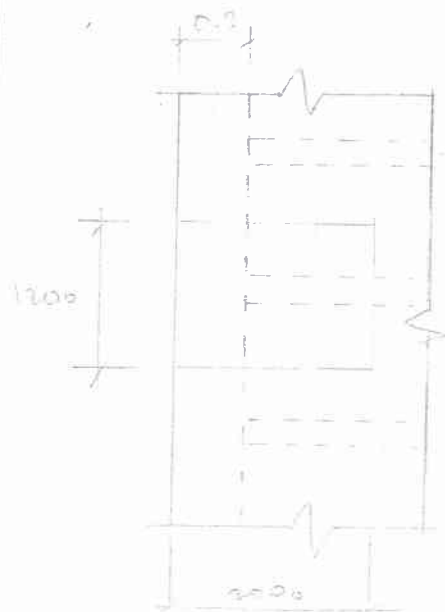
G = 2.4 kN/m²

Imposed loads

light vehicle = 2.5 kN/m²

Total = 2.5 kN/m²

Q = 2.5 kN/m²



$$P = 9.3 \text{ kN/m} \times 1.2 \text{ m} = 11.2 \text{ kN}$$

$$w = (G + 0.3Q) \times 1.2 \text{ m}$$

$$= (2.4 + 0.3(2.5)) \times 1.2 \text{ m}$$

$$w = 3.78 \text{ kN/m}$$

$$M^x = \frac{wL^2}{2} + PL$$

$$= \frac{(3.78 \text{ kN/m} \times (2 \text{ m})^2)}{2} + 11.2 \text{ kN} (2 \text{ m})$$

$$M^x = 30.0 \text{ kNm}$$

M^x = 30.0 kNm

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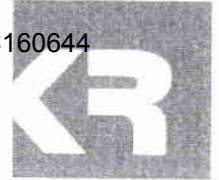
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Rib design - house areas:

Dead loads

Concrete slab (100mm) = 2.4 kN/m²

Partitions = 0.5 kN/m²

Total = 2.9 kN/m²

G = 2.9 kPa

Imposed loads

General areas, etc = 1.5 kN/m²

Q = 1.5 kPa



(Refer to pg. 5 for details)

$P = 11.2 \text{ kN}$

$w = (G + 0.3Q) \times 1.2 \text{ m}$

$= (2.9 \text{ kPa} + 0.3(1.5 \text{ kPa})) \times 1.2 \text{ m}$

$= 4.0 \text{ kN/m}$

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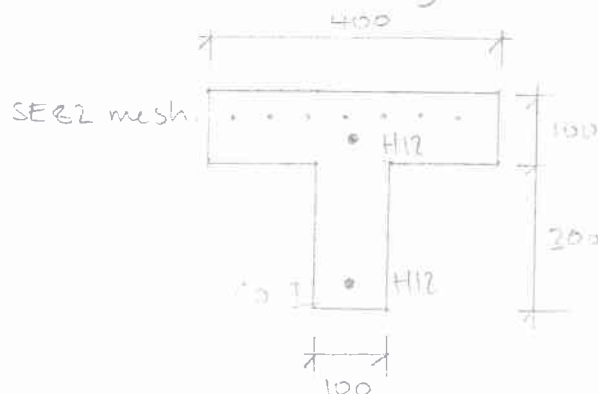
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Moment capacity of rib:



$$b_e = 100 + \frac{1200}{4} = 400 \text{ mm}$$

$$A_s = \text{SE82 mesh} + 2 \times \text{H12}$$

$$= (251 \times 0.4) + 112$$

$$A_s = 213 \text{ mm}^2$$

$$d = 300 + 100 - 20 = 370 \text{ mm}$$

$$M_n = A_s f_y \left(d - \frac{a}{2} \right)$$

$$= (213)(500) \left(370 - \frac{50}{2} \right)$$

$$M_n = 36.7 \text{ kNm}$$

$$a = \frac{A_s f_y}{\alpha f_c' b}$$

$$= \frac{(213)(500)}{0.85(25)(100)}$$

$$= 50.1 \text{ mm}$$

$$\phi M_n = 0.95 (36.7 \text{ kNm})$$

$$\phi M_n = 31.2 \text{ kNm}$$

$$\phi M_n = 31.2 \text{ kNm}$$

$$M^* \leq \phi M_n \quad \checkmark$$

$$(30 \text{ kNm}) \leq (31.2 \text{ kNm})$$



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Shear design of ribs:

Shear demand:



$$P = 11.2 \text{ kN (Refer pg. 5)}$$

$$w = 3.8 \text{ kN/m (" ")}$$

$$V^* = P + wL$$

$$= (11.2 \text{ kN}) + (3.8 \text{ kN/m} \times 2 \text{ m})$$

$$V^* = 18.8 \text{ kN}$$

$$V^* = 18.8 \text{ kN}$$

Shear capacity:

$$V_c = k_d k_a V_b \quad (k_d = k_a = 1.0)$$

$$V_b = \min(0.07 + 10\rho_w)\sqrt{f'_c}, \quad 0.2\sqrt{f'_c}$$

$$\rho_w = A_s / b_e d$$

$$A_s = 2H12 + 0.1m(5E82)$$

$$= (249 \text{ mm}^2) / (100 \text{ mm} \times 400 \text{ mm}) = 2(112 \text{ mm}^2) + 0.1(251 \text{ mm}^2)$$

$$= 6.23 \times 10^{-3}$$

$$= 249 \text{ mm}^2$$

$$V_b = 0.07 + 10(6.23 \times 10^{-3})\sqrt{25}$$

$$= 382 \text{ kPa}$$

$$V_c = (1.0)(1.0)(382 \text{ kPa})$$

$$= 382 \text{ kPa}$$

$$V_c = V_b A_{cv}$$

$$= (382 \text{ kPa})(100 \text{ mm} \times 400 \text{ mm})$$

$$V_c = 15.3 \text{ kN}$$

$$V_c = 15.3 \text{ kN}$$



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$$\begin{aligned} V_s &= A_v f_y d/s \\ &= -(+3^2) 300 \text{ MPa} (400/200) \\ &= 17.0 \text{ kN} \end{aligned}$$

$$\begin{aligned} \therefore V_u &= V_c + V_s \\ &= 15.3 \text{ kN} + 17.0 \text{ kN} \end{aligned}$$

$$V_u = 32.3 \text{ kN}$$

$$\begin{aligned} \phi V_u &= 0.75 (32.3 \text{ kN}) \\ &= 24.2 \text{ kN} \end{aligned}$$

$$\phi V_u = 24.2 \text{ kN}$$

$$\begin{aligned} \hookrightarrow V^* &\leq \phi V_u \\ 18.9 \text{ kN} &\leq 24.2 \text{ kN} \quad \checkmark \end{aligned}$$

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GROUND IMPROVEMENT REPORT

112 & 116 RANGIORA WOODEND ROAD
WOODEND

PREPARED FOR STEVEN & GAYLEEN CLEGG

JOB No. 157027
DATE: 17/11/2015
ISSUE: A

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
BC160644 24/06/2016 brendam

QUALITY CONTROL

Title 112 & 116 Rangiora Woodend Road, Woodend – Ground Improvement Report

Client Steven & Gayleen Clegg

Filename 157027

Issue A

Date 17/11/2015

Prepared By Name: Steven Roberts
CPEng (Geotechnical) MIPENZ, IntPE(NZ)Signature: Reviewed By Name: Scott McHardy
BEng Geotechnical (Hons)Signature: Authorised By Name: Steven Roberts
CPEng (Geotechnical) MIPENZ, IntPE(NZ)Signature: 

Limitations

This report has been prepared at the specific instructions of Steven & Gayleen Clegg in connection with the ground improvement design at 112 & 116 Rangiora Woodend Road, Woodend. No liability is accepted by this company or any employee of this company with respect to its intended use by any other person or persons.

The subsurface soil conditions and the interpretations reported are those identified at the test locations at the time of the geotechnical assessment and are subject to the limitations of the investigation methods. The test results represent only a small test sample of the total subsurface soils. Soil conditions may vary between the test locations and interpretation of the soil information and test results must take into account the spacing and plan location of the tests.

If subsurface conditions encountered on the site during construction appear to vary from those inferred from the information contained in this report, Kirk Roberts Consulting Engineers Ltd requests that it be notified immediately.

This report is only valid for the proposal as outlined in the introduction and the information and interpretation of the content in this report may not be relevant if the proposed development is altered in any way.

If the recipient of this report wishes to contact Kirk Roberts Consulting Engineers Ltd, either;
Email: info@kirkroberts.co.nz or Phone: 03 379 8600.

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1 INTRODUCTION

Kirk Roberts Consulting Engineers Ltd has been engaged by Steven and Gayleen Clegg to provide a design for the proposed ground improvement at 112 & 116 Rangiora-Woodend Road, Woodend. The site is classified as Technical Category 3 (TC3).

The client has discussed with Kirk Roberts Consulting Engineers Ltd the intention of developing each site with two single storey residential dwellings, varying in footprint from 150 – 200 m². The proposed houses are to be constructed of medium weight brick cladding and light weight corrugated iron roofing supported on a concrete foundation system. It is understood that 112 & 116 Rangiora Woodend Road have already been subdivided into four fee simple sections (Lots 1 to 4) by the current owner.

Review of Licenced Building Practitioner Wayne Worrall's Architectural drawings; indicate a single storey dwelling with an attached garage is to be developed on each of the Lots. The proposed dwellings are to be located centrally on each Lot site with grassed garden areas to the north, south and west. Patio and deck areas are located to the rear of the garage and along the western side of the dwelling respectively, while a sealed driveway runs from the Right of Way, along the eastern boundary of the site, to the garage. These features are not included within the area of ground improvement.

A geotechnical report completed by Kirk Roberts Ltd dated 02/10/2015 indicated that given the predicted liquefaction settlement, observed ground damage, and encountered soil profile, shallow foundation options to MBIE guidelines would be suitable for all of the sections subject to ground improvement. Following review of the foundation options, ground improvement in the form of stone columns to 3.0 m depth was chosen as the preferred foundation option by the client to protect the foundation system from moderate settlement damage during earthquakes.

2 SUPPORTING DOCUMENTATION

- Kirk Roberts Ltd's Geotechnical Report, dated 2nd October 2015
- Architectural drawings (prepared by Wayne Worrall for the proposed development at 112 and 116 Rangiora-Woodend Rd, Lots 1 to 4).

This design report is to be read in conjunction with the documents referenced above.

3 GROUND IMPROVEMENT PERFORMANCE OBJECTIVES

Stone column ground improvement is designed principally to reduce predicted vertical settlement for 25 and 500 year earthquake events, and also to improve soil bearing capacity under 'static load' combinations. The reduced liquefaction settlement allows for a stiff shallow foundation system to be constructed in lieu of a more expensive piled foundation system. The upper 'crust' layer should provide a minimum geotechnical ultimate bearing capacity of 300 kPa under static conditions.

The Cone Penetrometer Test results from the geotechnical investigation were reassessed for the above mentioned earthquake events using the widely accepted liquefaction analysis program, CLiq.

The expected ground improvement performance is to be confirmed by geotechnical testing after stone column installation, prior to construction of the dwelling foundation. The proposed ground improvement is designed to accommodate the dwelling and attached garage areas only.

4 STONE COLUMN GROUND IMPROVEMENT DESIGN

4.1 Discussion

Stone column ground improvement relies primarily on densifying the soils between the stone columns, however other factors which are either impossible or impractical to quantify, also improve the soils resistance to liquefaction. The most common secondary effects which improve the soil cyclic resistance ratio (CRR) are:

- Improved soil drainage which suppresses the build-up of excess porewater pressure during intense ground shaking
- Overconsolidation of the soil mass and hence increased soil strength
- Increased lateral confining stress (K_h value much greater than K_0 for 'at rest' soil state)
- 'Reinforcement effect' due to stiff stone columns

The lateral confining stress has a marked effect on increasing the soils' CRR, with potentially a 44% increase in the CRR value associated with a 100% increase in the K_0 value from 0.4 to 0.8¹.

Overconsolidation of the soil can also increase the CRR beyond the amount that is due to associated increases in K_0 , but the increase in the CRR range from being relatively minor to as much as the square root of the overconsolidation ratio². Stone column ground improvement should be evaluated by allowing a conservative increase of 30% in the factor of safety against triggering liquefaction to account for the combined secondary effects.

The 'reinforcement effect' due to the introduction of stone columns is difficult to quantify, but can be assessed by carrying out a dynamic numerical finite element model of the improved ground to assess the reduction in cyclic shear stress (CSR) and hence predicted increase in the factor of safety against liquefaction. Research carried out by R.R Goughnour & J.M Pestana (1998) indicated that the CSR reduction factor value (K_G) is a function of the Area Replacement Ratio (ARR); where ARR is parametric in the ratio of shear modulus of the stone column to the surrounding soil as proposed by Baez and Martin (1994).

Section 4.4 below discusses the stone column design approach for this site.

4.2 Stone Column Size and Distribution

The columns typically have a diameter ranging from 0.45 – 1.2 m and are positioned either on a triangular or square grid arrangement with a typical centre spacing of 1.2 – 2.0 m. Given the size and nature of the proposed dwellings, 0.85 m diameter stone columns laid out in a square grid arrangement should provide sufficient ground improvement to minimise the predicted ground surface damage due to liquefaction settlement.

A study into the effects of stone column spacing³ indicates that the level of improvement increased with smaller grid spacing; however, the soil profile also has a significant effect upon the level of improvement with stone column spacing. A grid layout of around 2 – 3 times the stone column diameter was found to be a good compromise between the level of ground improvement against the feasibility of construction and installation cost.

The term, *Area Replacement Ratio* (ARR), is often used to identify the level of ground improvement required and depends on engineering judgement combined with site-specific ground test results.

¹ "Ishihara et al 1977,1985"

² Lee and Focht,1975; Ishihara and Takatsu, 1979.

³ "Evaluation of Optimum Spacing of Stone Columns"; L. Rao, M. Madhira, 2010

The ARR value is often expressed as a percentage figure and is a function of the stone column diameter and column spacing. For this site an ARR value of 13.6% has been selected, based on a 0.85 m diameter stone column on a 2.04 m square grid arrangement. It's worth noting that results of the 2013 EQC ground improvement trials⁴ indicated that for deep columns of highly compacted aggregate, an ARR as low as 8 to 12% is sufficient to adequately mitigate liquefaction effects at the ground surface up to the ULS level of ground shaking, in terms of the objectives outlined in section 15.3 of the MBIE guidelines.

Therefore the adopted ARR value of 13.6% for this site is considered to be appropriate for the ground performance objectives discussed above.

4.3 Stone Column Treatment Depth

A significant percentage of the predicted settlement occurs within the upper 5 m soil layer and is expected to cause foundation damage to the proposed dwellings unless shallow ground improvement is carried out on both sites. Ground improvement to 3.0 m bgl is proposed for the site based on Kirk Roberts Ltd's interpretive geotechnical report completed 2nd October 2015.

Ground improvement to 3.0 m should reduce most of the predicted liquefaction and reduce differential settlement to the values summarised in table 4.3 below. Our view is that the residual predicted total settlements from 3.0 m bgl to 10.0 m bgl and to the termination depth of 17.5 – 20.5 m are reasonably uniform at the CPT locations, and accordingly are not considered to have a significant influence on foundation performance.

Table 4.3 below is reproduced from Kirk Roberts' 2nd October 2015 report which shows the predicted differential settlement below stone column ground improvement for SLS and ULS events.

Table 4.3: Predicted Residual Differential Settlement

Return Period	112 Rangiora Woodend Road		116 Rangiora Woodend Road	
	25yr (SLS)	500yr (ULS)	25yr (SLS)	500yr (ULS)
Residual differential settlement (mm) (3.0 m to 10.0 m)	25 – 55	30 – 60	70 – 75	75 – 80
Residual differential settlement (mm) (3.0 m to 17.5 – 20.5 m)	45 – 80	80 – 90	95	100

Considering the horizontal distance of approximately 20 – 25 m between the relevant CPT locations, the inferred ground slope due to predicted ULS differential settlement is within allowable limits to B1/VM4 of the Building Code.

⁴ Section 15.3, MBIE guidelines; version 3a.

4.4 Ground Improvement Design Methodology

For liquefaction to occur the *Cyclic Resistance Ratio*, which measures the soils' resistance to liquefaction must be less than the *Cyclic Stress Ratio* which is due to the seismic ground motion. Robertson et al (1998) recommends a factor of safety (FS) of 1.2 to mitigate liquefaction within a saturated soil deposit, where the FS can be expressed as:

$$FS = \frac{CRR}{CSR} \geq 1.2$$

When we consider the improvements due to stone column treatment, the above expression can be modified to account for the increase in the CRR value due to increased soil confinement and also reduction in the CSR value via the reduction factor value (K_G) as follows:

$$FS = \frac{1.3 * CRR}{K_G * CSR} \geq 1.2$$

4.4.1 Assessment of Expected Ground Improvement

We have recently implemented the PLAXIS 2D dynamic modelling package to assess the reduction in cyclic shear strain within the treated soil depth and hence the associated CSR reduction factor (K_G). Accordingly, a conservative K_G value of 0.55 has been adopted for design of ground improvement, based on an ARR value of 14% and a shear modulus ratio of 8. In assessing the shear modulus ratio, which is directly related to the Modulus of Elasticity (E_s), an E_s value of 40,000 kPa⁵ and 5000 kPa has been adopted for the stone column material and *unimproved* ground material respectively.

Refer to appendix A for the K_G factor verses area replacement ratio (ARR).

By applying a reduction factor (K_G) of 0.55 to the calculated CSR value from the CLiq analysis program (version 1.7.5.27), the resulting FS against liquefaction from CLiq analysis needs to be at least 0.51 to mitigate liquefaction risk within the treated soil depth, and equates to an initial FS of 1.2 divided by 2.36 (i.e. 1.3/0.55).

4.4.2 Assessment of Final Ground Improvement

Once ground improvement has been carried out with subsequent post ground improvement testing, the CLiq analysis can be repeated to quantify the increase in densification of the soil. The increase in soil density reduces the volumetric strain during ground shaking, resulting in a further reduction in the total predicted settlements. A conservative increase of 30% is once again applied to the post ground improvement CRR value to account for the combined secondary effects as discussed in section 4.1.

4.5 Ground Improvement Area

The ground treatment area is to extend at least 1.5 m beyond the building footprint at all points unless indicated otherwise on the ground improvement plan (Appendix D). A 200 mm thick compacted gravel layer is to be laid above the stone columns prior to construction of each dwelling foundation to achieve the required founding level for the specifically designed shallow foundation system.

⁵ Design and Construction of Stone Columns Volume 1; 1983 (US Department of Transportation)

4.6 Anticipated Ground Performance

It is anticipated that stone column ground improvement will reduce predicted SLS and ULS differential settlement beneath the treatment depth to approximately 25 to 75 mm and 30 to 80 mm for a SLS and ULS event respectively, (see table 4.3 above). Based on the horizontal distance between CPT locations, the predicted liquefaction induced differential settlement after ground improvement complies with the performance requirement of B1/VM4 in the New Zealand Building Code, which limits differential settlement to 25 mm over a 6 m span. However it should be noted that this performance requirement actually applies to long term static load settlement, and not liquefaction induced settlement.

The concrete foundation shall be founded on a gravel raft of sufficient stiffness in order to distribute the imposed foundation loads. The gravel raft shall assist in controlling minor lateral displacement and differential settlement damage and shall be constructed to the following specifications:

- Gravel raft shall be at least 200 mm thick and shall be laid to the required depth to suit the foundation system adopted by the client.
- The gravel material shall comprise AP65 crushed aggregate, laid in 100 mm thick layers and compacted to 95 % of Maximum Dry Density to NZS 4402:1986.

The gravel raft foundation will provide a geotechnical ultimate bearing capacity of at least 300 kPa in accordance with the definition of 'good ground' to NZS 3604:2011. A capacity reduction factor of 0.5 shall be applied to the ultimate bearing capacity which shall be used in combination with imposed static loadings determined in accordance with AS/NZS 1170:2002.

Both the predicted liquefaction induced differential settlements and bearing capacity are to be confirmed by cone penetrometer testing after stone column installation.

4.7 Stone Column Construction

Refer to Appendix C for stone column material grading and installation specification.

5 GEOTECHNICAL TESTING

Geotechnical testing, consisting of four Cone Penetration Tests (CPT01 – CPT04) was completed on site as part of the original ground investigation by Riley Consultants Ltd. Re-assessment of the original CPT test results, as presented in Kirk Roberts' geotechnical report dated 2nd October 2015 was carried out to quantify predicted liquefaction induced settlements before ground improvements and for comparison with post-ground improvement tests to confirm the performance of the stone column system.

Additional CPT testing is required after ground improvement at each dwelling location to confirm the increase in soil densification. A total of 8 CPT tests (2 per dwelling location) are required to confirm post ground improvement and each test shall be taken to 5 m below existing ground level.

Refer to Appendix D for proposed CPT test locations after ground improvement.

6 CONCLUSIONS

The ground improvement strategy adopted for this site comprises 0.85 m diameter stone columns installed in a square grid arrangement at 2.04 m spacing and to a ground treatment depth of 3.0 m.

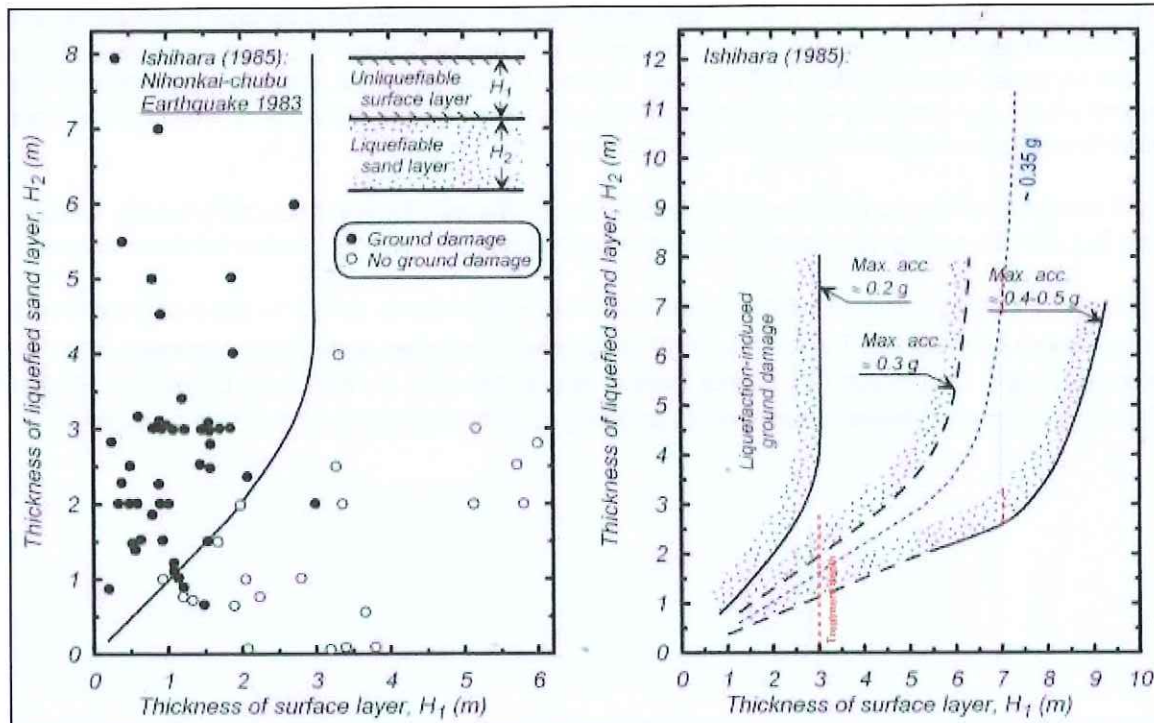
It is anticipated that stone column ground improvement should reduce predicted differential settlement beneath the treatment depth to approximately 25 to 75 mm and 30 to 80 mm for SLS and ULS events respectively. Based on the horizontal distance between CPT locations, the predicted liquefaction induced differential settlement after ground improvement complies with the performance requirement of B1/VM4 in the New Zealand Building Code, which limits differential settlement to 25 mm over a 6 m span.

Even though this criterion applies to long term static (SLS) loads, the indication is that potential differential settlement for a SLS and ULS event is not considered as being critical for design of the proposed shallow foundation system.

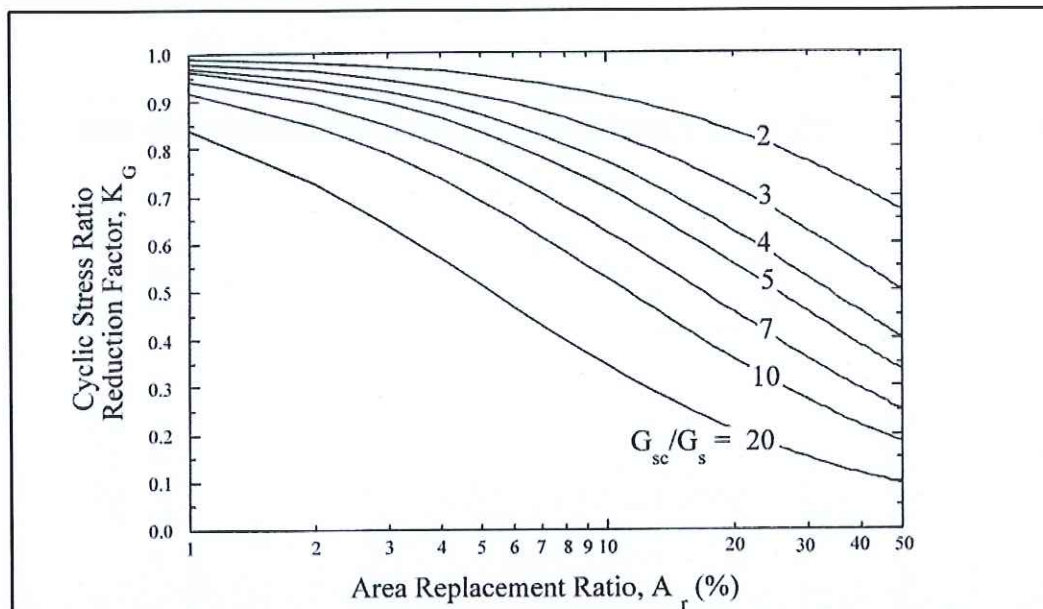
Additional CPT testing is required to 5.0 m bgl after stone column installation to confirm the improved ground density and resistance to liquefaction. The test results will be compiled in a revised geotechnical interpretive report and submitted to the Christchurch City Council together with a *Statement of Professional Opinion* and *Producer Statement Construction Review Statement (PS4)*, confirming suitability of the site for the proposed development.

APPENDIX A

- Ishihara (1985); Figure 107 from Idriss & Boulanger 2008
- R.R Goughnour & J.M. Pestana (1998)



Excerpt from Idriss & Boulanger 2008: [Figure 107: Ishihara (1985)]



Excerpt from Goughnour & Pestana 1998

APPENDIX B

- Producer Statement Design (PS1) for stone column ground improvement.

APPENDIX C

- Stone Column Specification

6.1 STONE COLUMN MATERIAL**6.1.1 General**

All material incorporated in the works shall be new unless otherwise specified and shall comply with the relevant standard specifications. Product manufacturer's data sheets of alternative material shall be submitted to the engineer for approval prior to use. A written statement regarding the origin, composition and manufacture of material should be supplied by contractors if required by the design engineer.

6.1.2 Stone Column Structural Fill

Material supplied for the construction of stone columns shall be hard, free from deleterious material and chemically inert so as to remain stable during construction and working life in the ground water conditions

The material for stone columns shall have a grading appropriate for compaction to form a dense column fully interlocked with the surrounding ground. Material should be compatible with the plant used and flow freely within bottom and through-feed delivery systems without arching, which may block these systems.

Specific test shall be carried out on the material supplied for stone column construction in accordance with NZS 4407:1991. Refer to Table 2.1 and Table 2.2 for specification.

SPECIFIC GRAVITY (NZS 4407.3.7.1/2)	>2.6
WEATHERING INDEX (NZS 4407.3.11)	AA or BA
CRUSHING RESISTANCE (NZS 4407.3.10)	<10% fines passing 2.36mm sieve under a load of 130kN

Table 2.1: Stone column structural fill requirements.

SIEVE SIZE (mm)	PERCENT PASSING
75	
37.5	100
19.0	50-80
13.2	
9.5	15-35
2.36	0-10
0.6	
0.075	

Table 2.2 : Grading for stone column structural fill.

Grading tests in accordance with NZS 4407:1991 should be carried out at a minimum of 1 test for every 200m³ of loose stone column fill material delivered to the site unless directed otherwise by the engineer. Representative samples of the loose structural fill shall be obtained in accordance with NZS 4407:1991.

6.1.3 Groutable Hard Fill

Grout pad hard fill should be gravelly sand. The gravelly sand is to be clean, well graded durable material that is acceptable to the engineer. The material shall not be subject to liquefaction once compacted in place. At the end of the process a low to medium porosity shall be reached.

The engineer shall inspect and approval a representative 10kg sample of gravelly sand prior to any sand being delivered to site. The sample will be compared to sand delivered to the site during the construction.

6.1.4 Acceptance of Material

When requested by the engineer, the contractor shall supply documentary evidence including manufacturer's test results to show that the materials comply with the specification before it is incorporated in to the contract works.

A copy of all test performed by the manufacture or supplier shall take the form of an IANZ accredited test report. The specific source of the sample material shall be stated. Acceptance will be based on the supporting document and test reports demonstrating that the works have been undertaken to the specified project requirements.

6.2 STONE COLUMN INSTALLATION

6.2.1 Setting out

Stone columns locations shall be marked with suitable identification maker and an established grid of lines shall be maintained for the duration of the works. All stone columns shall be carefully set as directed by engineer following completion of the trial.

6.2.2 Excavation and temporary support

During the preparation of the site loose material and vegetation shall be removed. Excavation shall show neatly cut surface free draining on its length.

Temporary excavation and/or lateral support required for the construction of ground improvement are to be designed by the contractors.

6.2.3 Working Platform

Granular material suitable for the ground condition of the site shall be used to set up a working platform for column installation. This should be designed, prepared and maintained efficient and suitable for safe movement and working plant, equipment and personnel.

6.2.4 Stone column installation

Prior to installation of production stone columns, a field trial shall be undertaken in accordance with this report.

The ground improvement shall be obtained by forming a continuous dense column of stone from the surface to the target treatment depth as shown on the stone column layout drawing. The stone columns are to be installed by a non-vibration, dry displacement method. This may be achieved by using McMillan Civil Ltd's patented stone column installation system or any other recognised non-vibration method.

The contractor shall develop a method to confirm that all the stone has been released into the column after each extraction of the casing. The contractor is to also establish a method for confirming that the stone is released from the casing at the same rate as the casing is extracted.

The contractor shall provide the Engineer with the construction methodology and shall obtain approval prior to mobilisation of plant, equipment and construction.

6.2.5 Stone Column Equipment and Method

An appropriate method of installation shall be established according with the present ground and groundwater condition. Columns shall be formed without the inclusion of unsuitable material that could prevent or inhibit full particle contact and interlocking of stone particles or reduce permeability.

The construction technique shall comply with the following requirements:

- Produce approximately circular holes.
- The casing and follower tubes shall be of sufficient length to reach the elevations shown on the drawings. Pre-boring of stiff lenses, layer or strata is permitted.
- The casing shall have visible external markings at 500mm increments or other system to enable measurement of penetration and re-penetration depths.
- The column is form by adding stone to fill the hole in order to apply lateral compaction/densification and force the stone radically out into the surrounding in situ soil.
- Stone column shall be installed so that each completed column will be continuous throughout its length.

6.2.6 Contractors Records

The Contractor is to:

- Confirm the volume of the gravel by measuring the level of the gravel in casing prior to withdrawal relative to the tip depth.
- Keep records of all important information for each column including depth of penetration, rate of penetration and rate of withdrawal, effort applied to compaction and groundwater conditions.

6.2.7 Stone Columns Tolerances

No stone column shall be more than 100mm off the location identified. The axis of the stone column shall not to be inclined from the vertical by more than 5mm in 3000mm (1:60 or 1 degree) as indicated by the tilt of casing and follower tubes.

For any group of consecutively installed columns, the average diameter over the total length shall not be less than the specified design diameter. Not more than one stone column in this group shall have an average effective diameter over its length of less than 90% of the average diameter of the group.

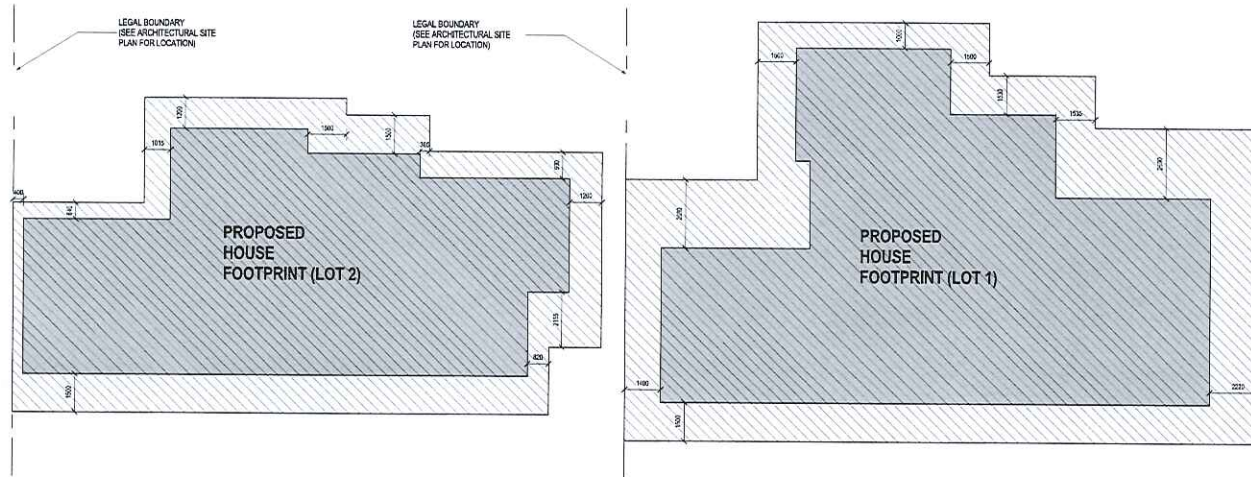
The average effective stone column diameter shall be calculated using the in situ density of the stone and the weight of stone supplied for the columns.

APPENDIX D

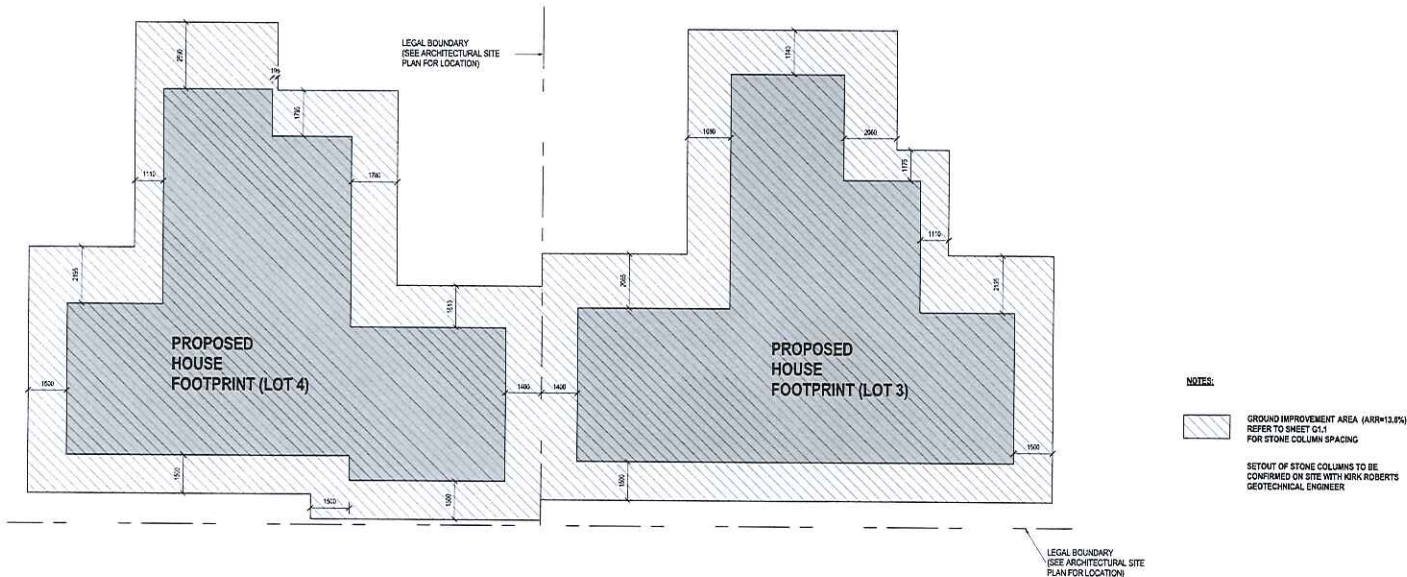
- G1.0 : Stone Column Layout Plan
- G1.1 : Site Plan

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Building Consent BC160639
Received 14/06/2016



STONE COLUMN SET-OUT PLAN LOT1 AND 2 AT 116 RANGIORA WOODEND ROAD
SCALE 1:100



STONE COLUMN SET-OUT PLAN LOT3 AND 4 AT 112 RANGIORA WOODEND ROAD
SCALE 1:100

- NOTES:**
- Kirk Roberts drawings are NOT to be used as Shop Drawings
 - Shop Drawings are to be provided for all Precast concrete and Structural steelwork for review prior to fabrication
 - Kirk Roberts takes no responsibility for the setout and dimensions when Shop drawings have not been provided
 - All Structural Drawings are to be read in conjunction with Architectural and all other Project Documentation. Any discrepancies shall be notified prior to any construction or fabrication
- Contractor to verify:**
- All structural drawings are the latest construction issue
 - All dimensions on site prior to commencing any work

A	16/11/2015	FOR CONSENT EXEMPTION	YH
No.	Date	Revision	By
KIRK ROBERTS CONSULTING ENGINEERS LTD Level 1, 237 St Asaph Street P.O. Box 10220 - Christchurch 8040 New Zealand P: (03) 378 8600 F: (03) 378 8600 E: info@kirkroberts.co.nz www.kirkroberts.co.nz Christchurch - Tauranga - Auckland			
Project: GROUND IMPROVEMENT AT 112 AND 116 RANGIORA WOODEND ROAD			
Client: STEVEN & GAYLEEN CLEGG			
Title: GROUND IMPROVEMENT STONE COLUMN SET-OUT PLAN FOR CONSENT			
Reviewed by: SMR		16/11/2015	
Designed by: SMR		Scale: 1:100@A1	
Drawn by: YH		Job No.: 157027	
This drawing is the property and copyright of KIRK ROBERTS CONSULTING ENGINEERS LTD and shall not be copied, reproduced or communicated to a third party without written consent (c) 2015		Drawing No.: G1.0 Rev.: A	

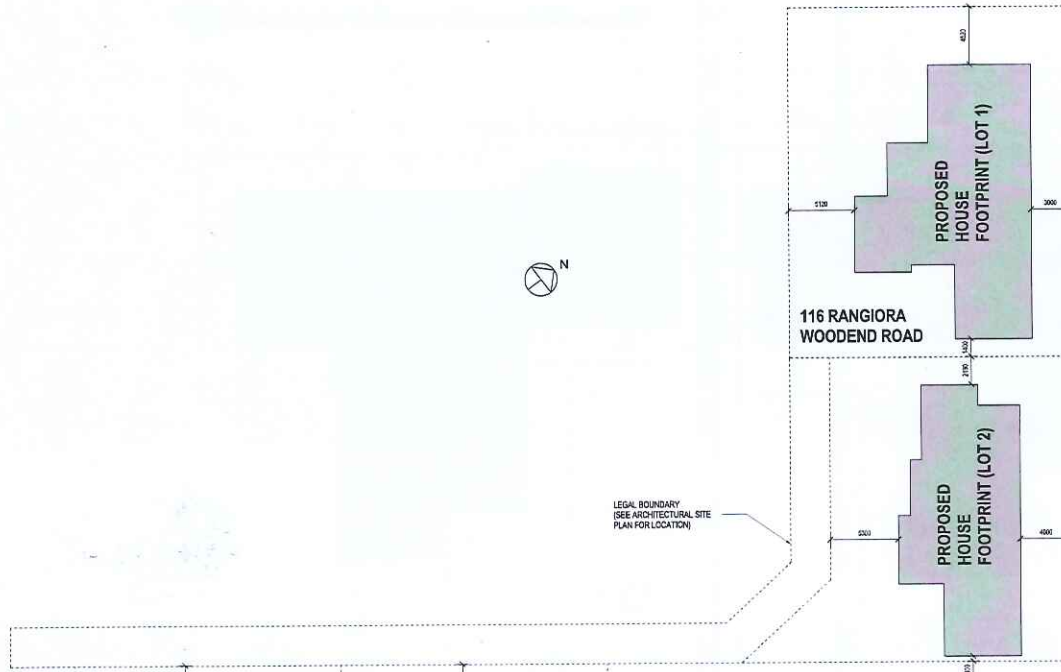
Consent Issued BC160644

Building Consent BC160639
Received 14/06/2016

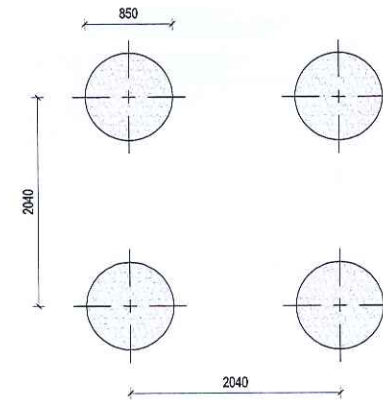
NOTES:

- Kirk Roberts drawings are NOT to be used as Shop Drawings
- Shop Drawings are to be provided for all Precast panels and Structural steelwork for review prior to fabrication
- Kirk Roberts takes no responsibility for the actual and dimensions when Shop Drawings have not been provided
- All Structural Drawings are to be read in conjunction with Architectural and all other Project Documentation. Any discrepancies shall be notified prior to any construction or fabrication

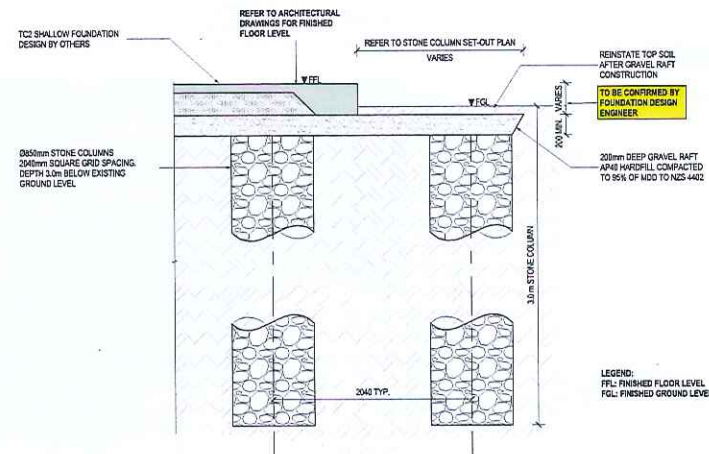
- Contractor to verify:**
- All structural drawings are the latest construction issue
 - All dimensions on site prior to commencing any work



Site
SCALE 1:200



TYPICAL STONE COLUMN ARRANGEMENT
SCALE 1:25



TYPICAL STONE COLUMN / SECTION
SCALE 1:25

No.	19/11/2015	FOR CONSENT EXEMPTION	YH
Date		Revision	
KIRK ROBERTS CONSULTING ENGINEERS LTD Level 4, 107 St Asaph Street P.O. Box 25231 - Christchurch 8040 New Zealand P: (03) 378 8888 F: (03) 378 8888 E: info@kirkroberts.co.nz Christchurch - Tauranga - Auckland www.kirkroberts.co.nz			
Project GROUND IMPROVEMENT AT 112 AND 116 RANGIORA-WOODEND ROAD			
Client STEVEN & GAYLEEN CLEGG			
Title SITE PLAN			
Reviewed by SMR Date 18/11/2015		Scale As Indicated @ A1 Job No. 157027	
Drawn by YH		Drawing No. G1.1 Rev. A	
This drawing is the property and copyright of KIRK ROBERTS CONSULTING ENGINEERS LTD and shall not be copied, reproduced or transmitted in any form or by any means electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without prior written permission from KIRK ROBERTS CONSULTING ENGINEERS LTD.			

SECTION 3

Truss Details & Bracing Details

(Include Fixings of Gib & Ecoply)

- Design IT Calcs**
- Hyspan etc.**

AKARANA TIMBERS CHRISTCHURCH

AGREEMENT LETTER

NOMINATED FABRICATOR = AKARANA TIMBERS (Ph: 03 347 8845)

DATE: 17 June 2016
CLIENT: ITM Probuild
JOB NAME: Dwelling 4
SITE ADDRESS: Woodend Road
JOB REF: QCH1551

CONSENT NO: BC 160644

E-MAILED
24/06/2016

Attn: Territorial Authority

We have been engaged to provide the trusses and / or frames for the above project.
To allow completion of the consent application we have supplied the following information:

- (a) Truss Layout and Producer Statement
- (b) Internal load bearing walls identified
- (c) Slab thickening areas identified for single floor levels only
- (d) The size of the lintels that provide the support to trusses
- (e) Timber treatment defined within the scope of NZS3602 (relating to the frames & trusses)

On advice from the building project owner, the structure will be designed under the following parameters

Roofing material:	Gavl .5mm Longrun Iron	Wind zone:	High
Soffit:	600mm	Snow load:	0.441kPa (basic roof load)
Spacing:	900mm	Snow load:	0.900kPa (O/G snow load)
Roof pitch:	25°		

Treatment Definition:

Roof Trusses: 90x45mm SG KD (H1.2)
External Walls: 90x45mm SG KD (H1.2) (Stud centers as per NZ3604:2011)
Internal Walls: 90x45mm SG KD (H1.2) (Stud centers as per NZ3604:2011)

We can advise that the following will be provided at the time of truss manufacture to both the building owner and your office:

- (1) A full 'as-built' layout and Producer Statement
- (2) Specific truss/truss fixings done as per NZS3604:2011, Clause 10.2.2.6.1
- (3) Specific top plate to stud fixings that comply with NZS3604:2011, Table 8.18
- (4) Specific lintel fixings outside NZS3604:2011

It should be noted that the details provided have been designed to comply with the Building Code and relevant standards. Any increase above these standards is only at the preference and request of the building owner.

Acknowledgement of this letter, along with the Building Consent number, is required by our company as soon as available

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
BC160644 24/06/2016 brendam

**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.mitek.nz.co.nz

Building Consent BC160644
Received 22/06/2016

MiTek 20/20 Engineering 4.6.6.301

Printed: 13:35:48 17 Jun 2016

PRODUCER STATEMENT for MiTek 20/20® TRUSS DESIGN - Version 4.6

ISSUED BY: **MiTek New Zealand Limited**
TO: **Akarana Timbers Christchurch**
IN RESPECT OF: **MiTek® Truss Designs**

This producer statement covers the MiTek 20/20® truss design and the structural performance of the GANG-NAIL® connector plate for the job reference **QCH1551** 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 Clause B1 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

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: Friday, 17 June 2016

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
BC160644 24/06/2016 brendam

Job: QCH1551

Client: ITM PROBUILD

Site:

Description: 12585 DWELLING, WOODEND

Building Consent No.:

MITek 20/20 Engineering 4.6.6.301

Phone:

Consent Issued BC160644

Phone:

Printed: 13:35:48 17 Jun 2016

Building Consent BC160644
Received 22/06/2016**MITEK FABRICATOR DESIGN STATEMENT**

This statement is issued by MiTek accredited fabricator **Akarana Timbers Christchurch**, 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		Pitch:	25.000 deg	Nominal Overhang:	600 mm
Timber Group:	SGx45 H1.2	Ceiling		Wind	
Material:	Longrun Iron	Material:	Standard	Area:	High (44.0 m/s)
Dead Load:	0.210 kPa	Dead Load:	0.200 kPa	Pressure Coeff:	Cpe = varies; Cpi = -0.30, 0.20
Restraints:	900 mm centres	Restraints:	400 mm centres	Snow	
Live Load:	Q _{ur} = 0.250 kPa	Live Load:	Q _c = 1.400 kN	Location:	Christchurch (N4) at 100 m
	Q _c = 1.100 kN			Open Ground Load:	0.900 kPa
				Basic Roof Load:	0.441 kPa

The timber for these MiTek® trusses shall be treated to the requirements of NZS 3602:2003 and shall be graded to the requirements of NZS 3603:1993. Unless otherwise noted, this design assumes that the steel fixings and timber connectors proposed are located in a "closed environment", as defined by NZS3604:2011 Section 4.

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	3	4904	18.249	900	J05A	1	2612	25.000	900	T04	1	7255	25.000	900
*HB02	1	1210	18.249	900	J05B	1	2612	25.000	900	T05	1	7070	25.000	900
*HB03	2	4826	18.249	900	J06	1	1712	25.000	900	T06	1	7255	25.000	853
*HB04	1	1194	18.249	900	J06A	1	1712	25.000	900	T07	1	7070	25.000	853
*HB05	1	2550	18.249	900	J07	2	1840	25.000	900	T07A	2	7070	25.000	853
*HB06	1	5816	18.249	900	J07A	2	1840	25.000	900	T07B	1	7070	25.000	853
*HB07	1	2441	18.249	900	J07B	1	1840	25.000	900	T08	3	2612	25.000	889
*HB08	2	3631	18.249	900	J08	1	2567	25.000	900	T09	1	4810	25.000	900
J01	1	2867	25.000	900	*R01	2	1680	25.000	900	T10	2	2405	25.000	947
J01A	1	2867	25.000	900	*R01A	1	1680	25.000	900	T11	2	2405	25.000	671
J01B	1	2868	25.000	900	*R02	8	913	25.000	900	T12	2	3890	25.000	871
J01C	1	2868	25.000	900	*R02A	8	913	25.000	900	T13	1	2405	25.000	900
J01E	1	2867	25.000	900	*R03	1	1625	25.000	900	TG01	1	7070	25.000	900
J02	1	1967	25.000	900	*R03A	1	1625	25.000	900	TG02	1	3980	25.000	900
J02A	2	1967	25.000	900	*R04	1	901	25.000	900	V01	1	1946	25.000	900
J02B	2	1967	25.000	900	*R05	1	1687	25.000	900	V02	1	1056	25.000	900
J02C	1	1967	25.000	900	*R06	1	1425	25.000	900	V03	1	695	25.000	900
J03	1	2812	25.000	900	*R07	1	1553	25.000	900	V04	1	1643	25.000	900
J03A	1	2812	25.000	900	*R07A	1	1553	25.000	900	V05	1	1734	25.000	900
J03B	1	2812	25.000	900	T01	1	5780	25.000	900	V06	1	1064	25.000	900
J04	2	1912	25.000	900	T02	1	5670	25.000	900	V07	1	2145	25.000	900
J04A	2	1912	25.000	900	T02A	1	5670	25.000	900					
J05	2	2612	25.000	900	T03	1	7255	25.000	900					

Total quantity : 99

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
BC160644 24/06/2016 brendam

The computer design input has been carried out by:

Signed:

Date: ...Friday, 17 June 2016....

Name of Detailer: Nick Buckley

Qualifications and Title: Detailer

On behalf of:

Akarana Timbers Christchurch

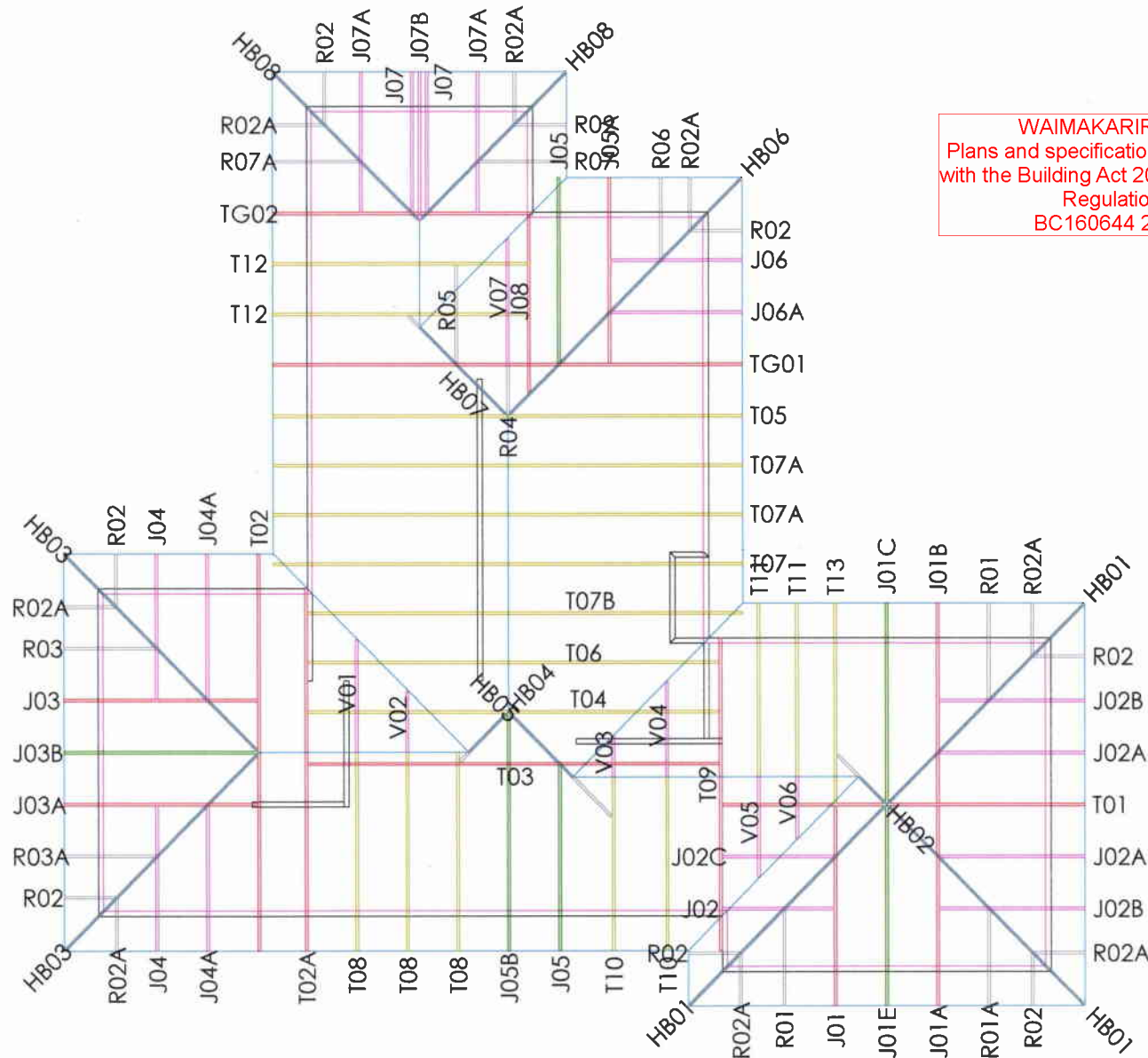


18 Hynds Drive, I-Zone Industrial Park, Rolleston 7675, New Zealand
Phone: Ph 03 3478845

Consent Issued BC160644

Building Consent BC160644
Received 22/06/2016

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
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BC160644 24/06/2016 brendam



Site Address :
ITM Probuild
Dwelling 4
Rangiora - Woodend Road
Woodend

Sheet Title :
**For Building Consent
Buildable Truss Layout**
Date : 17 June, 2016 Drawn : Nick Buckley
Scale : 1:100 System : MiTek 20/20

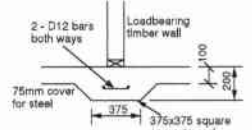
Job Details:
Roof Pitch : 25.00deg
Roof Material : Longrun Iron
Ceiling Material : Standard
Wind Zone : High
Roof Snow Load : 0.441kPa

Truss Centres : 900mm
Roof Live Load : 0.250kPa
Floor Live Load :
Wind Speed : 44m/s
Overhang : 600mm



Job Title :
QCH1551
Sheet :
1
Revision Number :

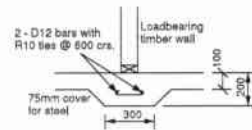
Slab Thickening Details



TYPE FP1 - 375x375mm Pad



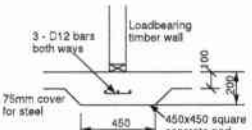
Number of Underlugs



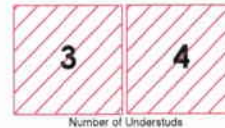
TYPE FS1 - 300mm Strip footing



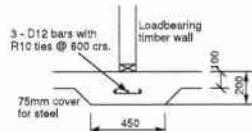
Number of Underlugs



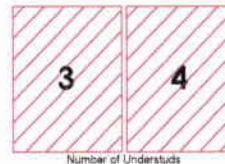
TYPE FP2 - 450x450mm Pad



Number of Underlugs



TYPE FS2 - 450mm Strip footing



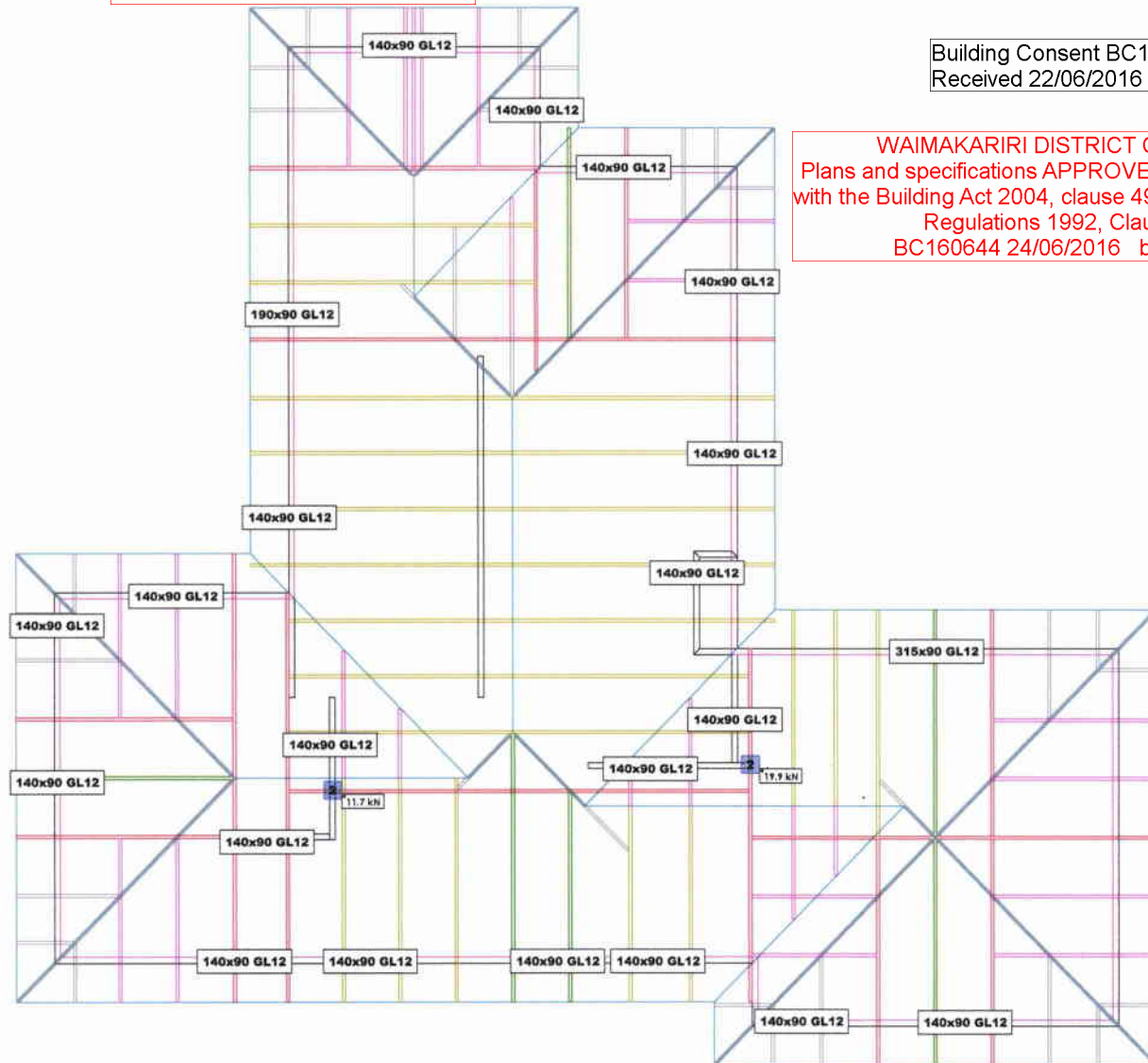
Number of Underlugs

NOTES:

The numbers found within the hatched area are the number of studs required below each truss. Refer to:
GANG-NAIL Internal Load Bearing on Concrete Floor Slabs brochure 10/2011

Building Consent BC160644
Received 22/06/2016

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance with the Building Act 2004, clause 49 and the Building Regulations 1992, Clause 3
BC160644 24/06/2016 brendan



Site Address :
ITM Probuild
Dwelling 4
Rangiora - Woodend Road
Woodend

Sheet Title :
For Building Consent
Slab Thickening/Lintel Sizes

Date : 17 June, 2016 Drawn : Nick Buckley
Scale : 1:100 System : MiTek 20/20

Job Details:
Roof Pitch : 25.00deg
Roof Material : Longrun Iron
Ceiling Material : Standard
Wind Zone : High
Roof Snow Load : 0.441kPa

Truss Centres : 900mm
Roof Live Load : 0.250kPa
Floor Live Load :
Wind Speed : 44m/s
Overhang : 600mm



Job Title :
QCH1551
Sheet :
2
Revision Number :

PrimeCad v4.6.6.301

Truss Fixings



A - LUMBERLOK JH47x90 Joist Hanger



B - LUMBERLOK JH47x120 Joist Hanger



D - LUMBERLOK JH47x190 Joist Hanger



E - LUMBERLOK JH95x165 Joist Hanger



C - Pair of LUMBERLOK CT200 Ceiling Ties



M - Pair of LUMBERLOK Multi Grips



NP - LUMBERLOK Nailon Plate



N - LUMBERLOK N21 Diagonal Cleat



P - LUMBERLOK TTP 16kN Truss to Top Plate set

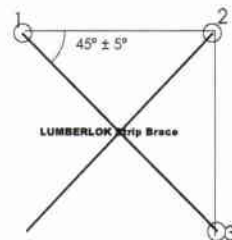


Q - LUMBERLOK TTP 9kN Truss to Top Plate set

Roof Bracing

Refer to:
LUMBERLOK Roof Bracing Specifications
brochure 08/2006 for end fixing details.

The brace must be located such that it forms an
angle of $45^\circ \pm 5^\circ$ to the wall



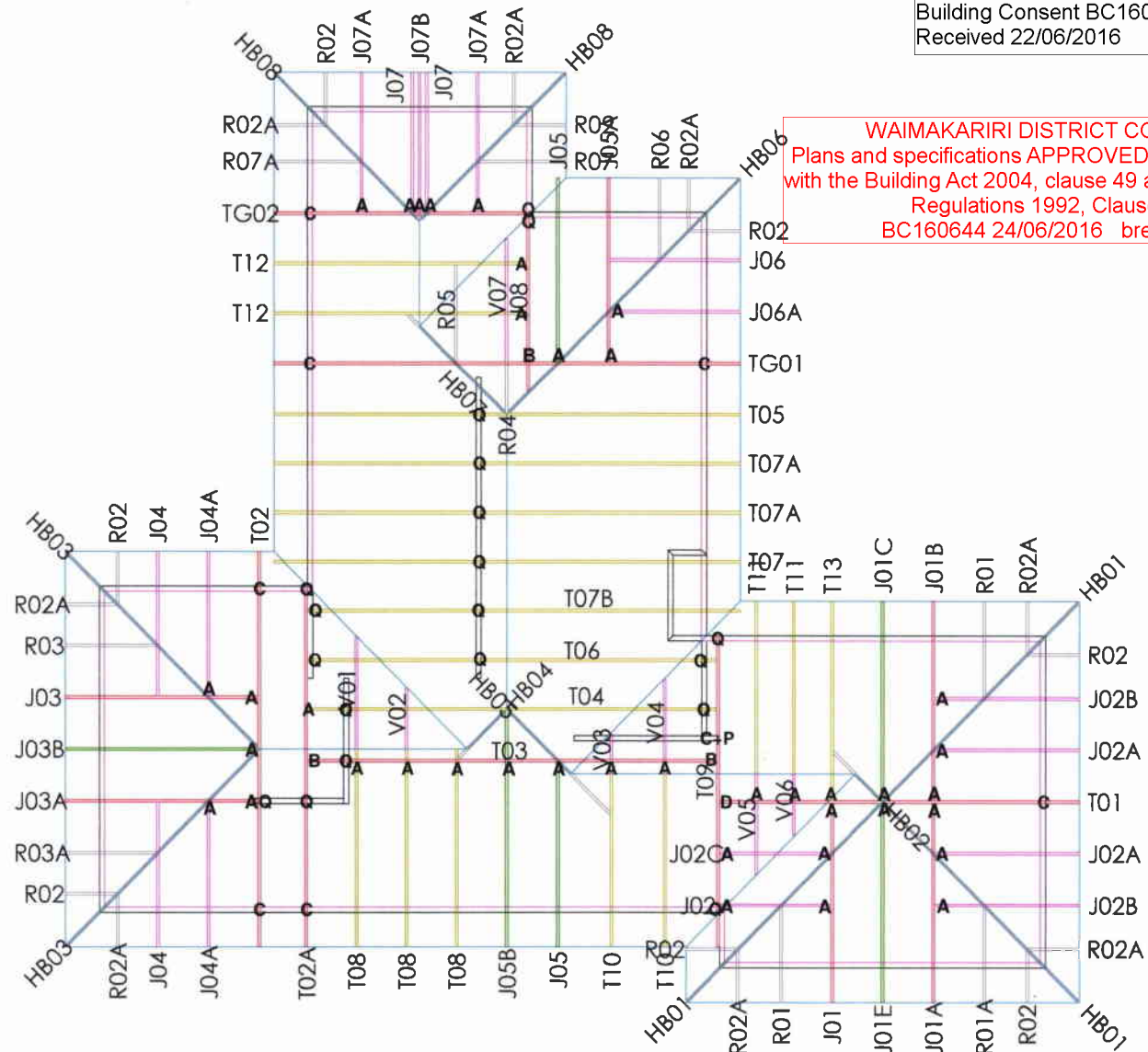
NOTES:

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

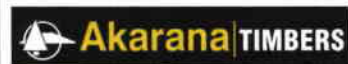
Refer to:
LUMBERLOK Timber Connectors Characteristic
Loadings Data brochure 03/4

Building Consent BC160644
Received 22/06/2016

WAIMAKARIRI DISTRICT COUNCIL
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Regulations 1992, Clause 3
BC160644 24/06/2016 brendanm



PrimeCad v4.6.6.301



Site Address :
ITM Probuild
Dwelling 4
Rangiora - Woodend Road
Woodend

Sheet Title :
For Building Consent
Truss Fixings & Roof Bracing

Date : 17 June, 2016
Scale : 1:100
Drawn : Nick Buckley
System : MITek 20/20

Job Details:
Roof Pitch : 25.00deg
Roof Material : Longrun Iron
Ceiling Material : Standard
Wind Zone : High
Roof Snow Load : 0.441kPa

Truss Centres : 900mm
Roof Live Load : 0.250kPa
Floor Live Load :
Wind Speed : 44m/s
Overhang : 600mm



Job Title :
QCH1551
Sheet :
3
Revision Number :



Wall Bracing Calculation Sheet A

JUNE 2011

Job Details (tick appropriate boxes)

Box 1

Name	CLEGG		
Street Address	WOODEND / RANGIDRA RD.		
Lot No		DPS No	
City/Town	WOODEND		
Location of Storey:		Floor type:	Floor load:
Single upper storey	☒	Sub-floor	2kPa ☒
Upper storey of two		Slab	3kPa ☒
Lower storey of two			
Key dimensions			
Building height to apex	4.6	Metres	Cladding weight
Roof height above eaves	2.2	Metres	Sub-floor
Stud height	2.4	Metres	Lower storey
Average roof pitch	25	Degrees	Upper or Single Storey
Building Length	17.01	Metres	Roof weight
Building Width	15.12	Metres	Light ☒ Heavy
Gross Plan Area	157.13	Sq Metres	Room in roof space
			Yes ☒ No

Note: When the average roof pitch is over 25 degrees, use the eaves length and width to determine BL and BW

Wind Zone

Box 2

Action	Reference	Values available	Outcome
Wind Region	Figure 5.1	A, W	A
Lee Zone	Figure 5.1	Yes, No	NO
Ground Roughness	Page 6	Urban, Open	URBAN
Site Exposure	Page 7	Sheltered, Exposed	Sheltered
Topographic Class	Tables 5.2 and 5.3 + Fig 5.2	Gentle to Steep	T1
Wind Zone	Table 5.4	L, M, H, VH, EH, SED	H

Earthquake Zone

Box 3

Action	Reference	Values available	Outcome
Earthquake Zone	Figure 5.4	1, 2, 3, 4	2
Site subsoil classification	Page 9	A, B, C, D, E	D/E

BUs required Wind

Box 4

W Across		60	BUs per m	(From NZS 3604:2011 tables 5.5, 5.6 and 5.7)
W Along		55	BUs per m	
Total Wind Load				
W Across	Enter BL from box 1	Multiply by	BUs per m Across	Equals Across W required
	17.01	x	60	1020
W Along	Enter BW from box 1	Multiply by	BUs per m Along	Equals Along W required
	15.12	x	55	831

BUs required Earthquake

Box 5

E = 9 x 8	7.2	BUs per m ²	(From NZS 3604:2011 tables 5.8, 5.9 and 5.10)
Note: For a room in the roof space use E + 3 BU/m ²			
Total Earthquake Load			
EQ Requirement Along and Across	Enter GPA from box 1	Multiply by	E
	157	x	7.2
			1130
Transfer to calculation sheet B			

For manual calculations only

GIB EzyBrace® Systems



Wall Bracing Calculation Sheet B

JUNE 2011

Along

WALL OR BRACING LINE		BRACING ELEMENTS PROVIDED			WIND		EARTHQUAKE	
1	2	3	4	5	6 W	7 W	6 E	7 E
Line Label	Minimum BUs Required	Bracing Element No.	Bracing Type	Length Element (m) L	Rating BU/m W	BUs Achieved (BU/m x L) W	Rating BU/m E	BUs Achieved (BU/m x L) E
A		A1, A2	EPI	0.9 (x2)	95	171	105	188
		B1, B2	EPC	0.5 (x2)	100	100	115	115
C1		GS2-N	2.4	95	228	85	204	
D1, D2		EPI	0.8 (x2)	95	152	105	168	
D3		EPI	1.2	120	144	135	162	
D4		EPC	0.4	100	40	115	46	
D		E1, E2, E3	EPI	1.2 (x2)	120	576	135	648
E		E4						
Totals Achieved					W achieved	11411	E achieved	1531
From Sheet A Totals Required					W required*	831	E required*	1130
					W achieved must exceed W required*		E achieved must exceed E required*	
					* from Calculation Sheet A			

Across

WALL OR BRACING LINE		BRACING ELEMENTS PROVIDED		
1	2	3	4	5
Line Label	Minimum BUs Required	Bracing Element No.	Bracing Type	Length Element (m) L
M		M ₁	GS1-N	2.0
		M ₂	EPI	1.2
N ₁ , N ₂		EPI	1.2 (x2)	
N ₃		GS2-N	1.8	
O ₁ , O ₂		EPI	0.45 (x2)	
O ₃ , O ₄		GS2-N	3.0, 2.4	
P ₁ , P ₂ , P ₄		EPI	1.8, 0.6, 0.9	
P ₃		GS2-N	1.8	
Q ₁ , Q ₂		EPI	1.2 (x2)	
Q				

WIND	
6 W	7 W
Rating BU/m W	BUs Achieved (BU/m x L) W
70	140
120	144
120	288
95	171
100	90
95	513
95	218
95	171
120	288

EARTHQUAKE	
6 E	7 E
Rating BU/m E	BUs Achieved (BU/m x L) E
60	120
135	162
135	324
85	153
115	103
85	459
105	241
85	153
135	324

Totals Achieved	
From Sheet A Totals Required	

W achieved	2023
W required*	1020
W achieved must exceed W required*	

E achieved	2039
E required*	1130
E achieved must exceed E required*	

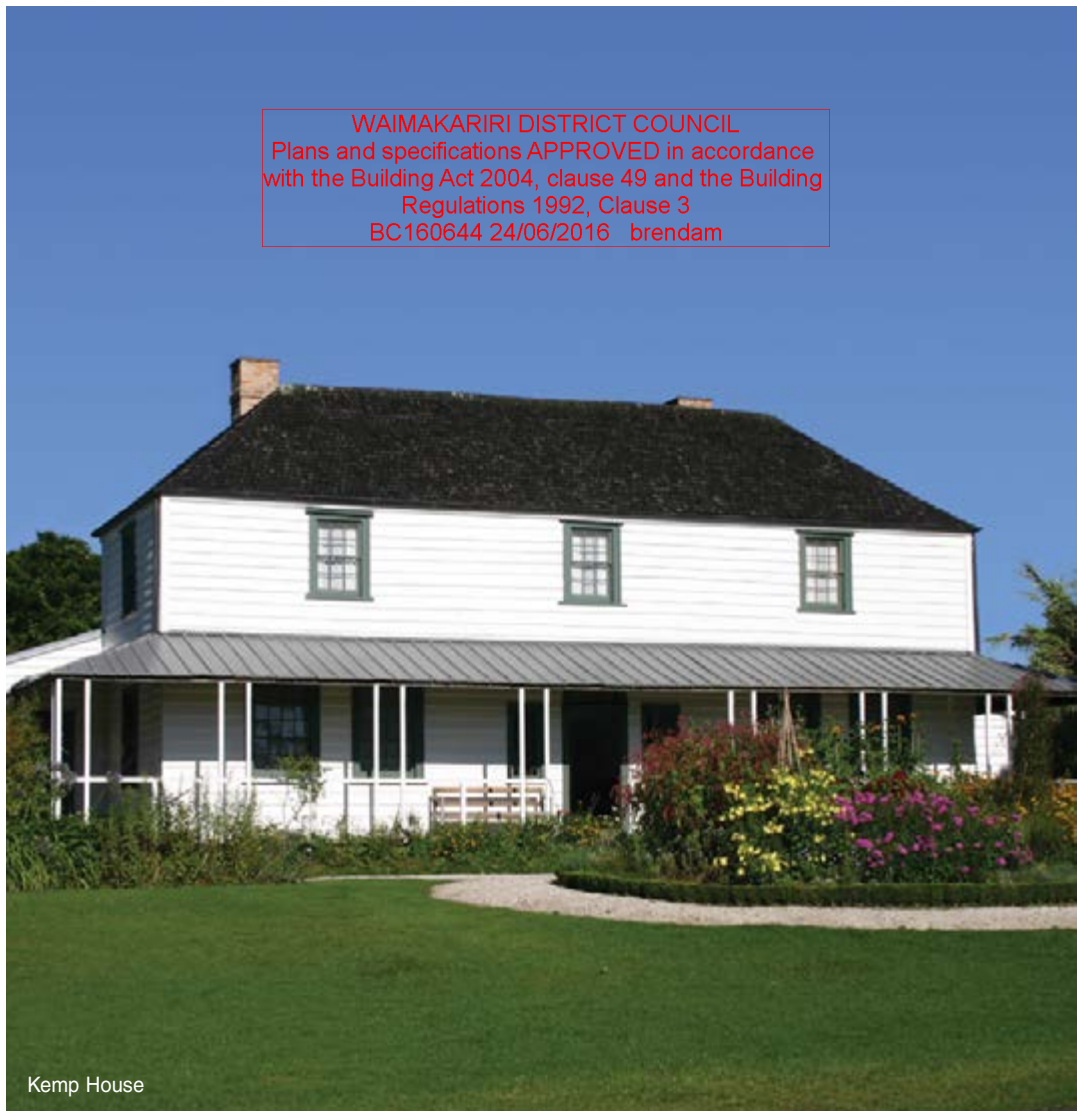
For manual calculations only

* from Calculation Sheet A

For manual calculations only

GIB EzyBrace[®] Systems

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
BC160644 24/06/2016 brendam



Kemp House



GIB® Plasterboard Linings

When fixing part sheets of GIB® Plasterboard, a minimum 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, the sheet end butt joints may be back-blocked.

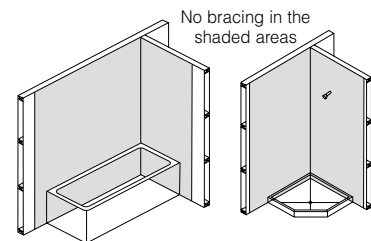
Plasterboard bracing element sheets must be fixed directly to the wall framing, eg bracing must be provided by the inner layer of a multilayer system. When a GIB® bracing element has been designated for a section of wall, BU ratings can not be increased by incorporating additional proprietary bracing 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.

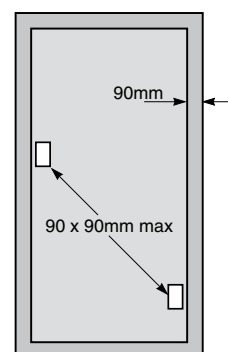
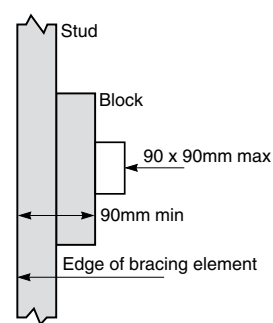
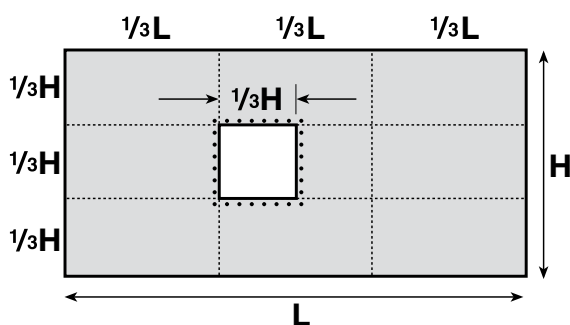


Renovation

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

Openings in Bracing Elements

Openings are allowed within the middle third of a wall bracing element's length and height. Neither opening dimension shall be more than one third of the element height. Wall linings are fixed to opening trimmers at 150mm centres. 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.



□ Small opening e.g. switch box



Framing

General framing requirements such as grade, spacings and installation shall comply with the New Zealand Building Code and the provisions of NZS 3604:2011. To achieve the published bracing performance the minimum actual framing dimensions are 90 x 35mm for external walls and 70 x 45mm for internal walls. Wall bracing tests on GIB EzyBrace® Systems were undertaken without nogs. Nogs are not considered to add to the bracing performance of the wall.

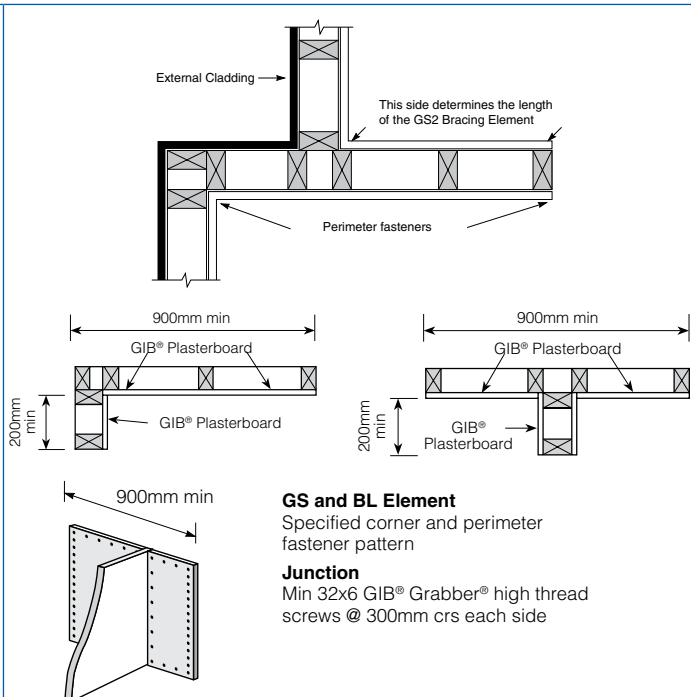
Guidelines for intersection walls

Where the lining on a double lined internal GS2 Bracing Element is shorter on one side, the length of the element is taken as the shorter wall length but bracing fasteners can still follow the wall perimeter on both sides.

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 or L junction the element is deemed to be continuous for the whole length (900mm in the example illustrated).

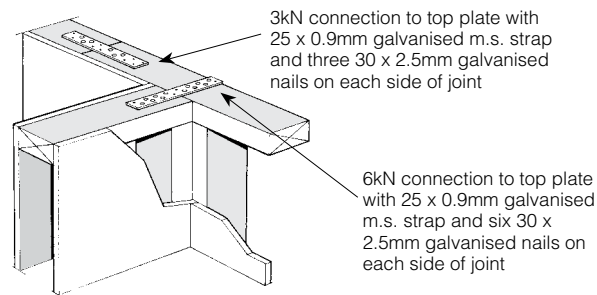
When fixing part sheets of GIB® Plasterboard, a minimum width of 300mm applies for bracing elements.



Top Plate Connections

The top plate of a wall that contains one or more wall bracing elements shall be jointed according to the rating of the highest-rated individual wall bracing element as follows:

- Rating not exceeding 100 bracing units: A 3kN connection as shown or by an alternative fixing of 3kN capacity in tension or compression along the plate;
- Rating exceeding 100 bracing units: A 6kN connection as shown or by an alternative fixing of 6kN capacity tension or compression along the plate.



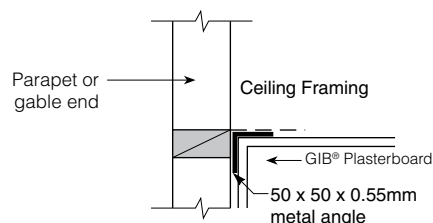
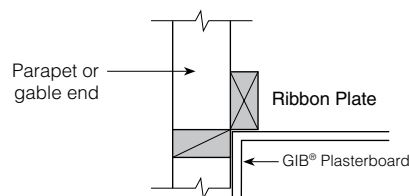
Parapets and Gable End Walls

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 90x45mm ribbon plate is fixed across the studs just above a row of nogs at the ceiling line.

OR

A minimum 50x50x0.55mm metal angle is installed as shown. The angle is fixed to a row of nogs with 30x2.5mm galv FH nails at 300mm centres.





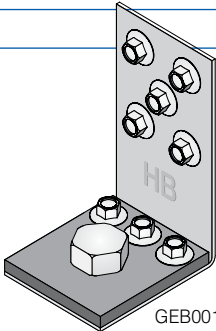
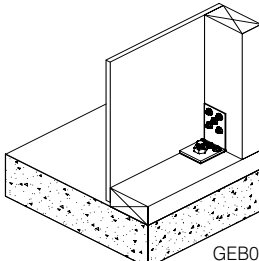
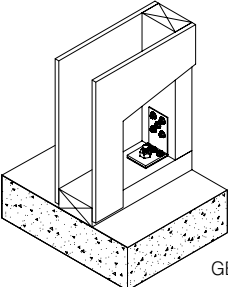
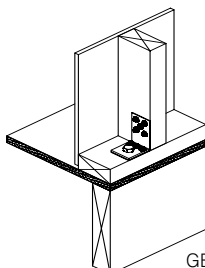
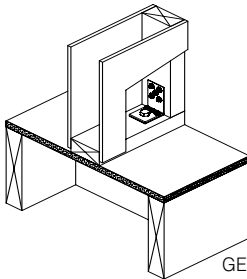
Bottom Plate Fixing

JUNE 2011

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 washers, 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		
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 pages 19 and 20.		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.
BLG-H	Not applicable	As for GSP-N, BL1-H, BLP-H on concrete slab above	In addition: GIB Handibrac® fixings or metal wrap-around strap fixings and bolt as illustrated below.



Panel Hold-down Details

GIB HandiBrac® – RECOMMENDED METHOD			
Developed in conjunction with MiTek™ NZ, the GIB HandiBrac® has been designed and tested for use as a hold-down in GIB® BL and GSP bracing elements. • The GIB HandiBrac® registered design provides for quick and easy installation • The GIB HandiBrac® provides a flush surface for the wall linings because it is fitted inside the framing. There is no need to check in the framing as recommended with conventional straps • The GIB HandiBrac® is suitable for both new and retrofit construction • The design also allows for installation and inspection at any stage prior to fitting internal linings			 GEB001
Concrete Floor		Timber Floor	
External walls	Internal walls	External walls	Internal walls
 GEB002	 GEB003	 GEB004	 GEB005
Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate		Position GIB HandiBrac® in the centre of the perimeter joist or bearer	
Position GIB HandiBrac® at the stud / plate junction		Position GIB HandiBrac® in the centre of floor joist or full depth solid block	
Hold-down fastener requirements			
A mechanical fastening with a minimum characteristic uplift capacity of 15kN.		12x150mm galvanised coach screw	

Refer to gib.co.nz/cad for CAD details.



Bracing strap Installation

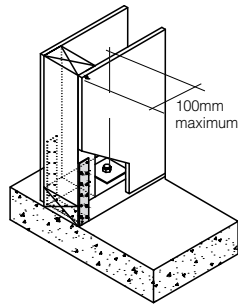
Care needs to be taken with the installation of the bracing strap. It should be checked in to be flush with the face of the stud providing a flat substrate for the plasterboard. It should be positioned in such a way that the important corner fastenings of the bracing element are not affected by it. Keeping the strap to the edge of the end stud as shown will allow the important corner fastenings to be installed without having to penetrate the bracing strap.

Concrete Floor

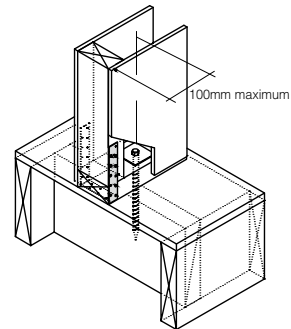
Timber Floor

400 x 25 x 0.9mm galvanised strap to pass under the plate and up the other side of the stud. Six 30x2.5mm flat head galvanised nails to each side of the stud. Three 30x2.5mm flat head galvanised nails to each side of the plate. Hold down bolt to be fitted within 100mm of the end of the element.

Internal wall

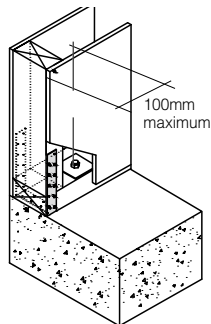


GEB006

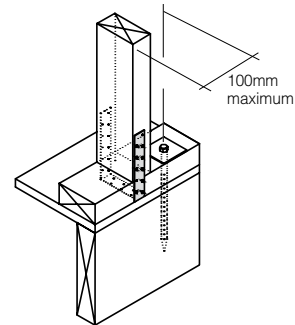


GEB007

External wall



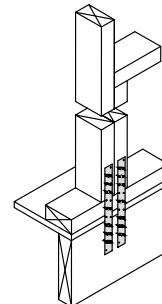
GEB008



GEB009

NB: 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 the web address gib.co.nz/cad

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.



GEB010

Hold-down fastener requirements

Concrete floor

Timber floor

A mechanical fastening with a minimum characteristic uplift capacity of 15kN fitted with a 50x50x3mm square washer within 100mm of the ends of the bracing element.

12x150mm galvanised coach screw fitted with a 50x50x3mm square washer within 100mm of the ends of the bracing element

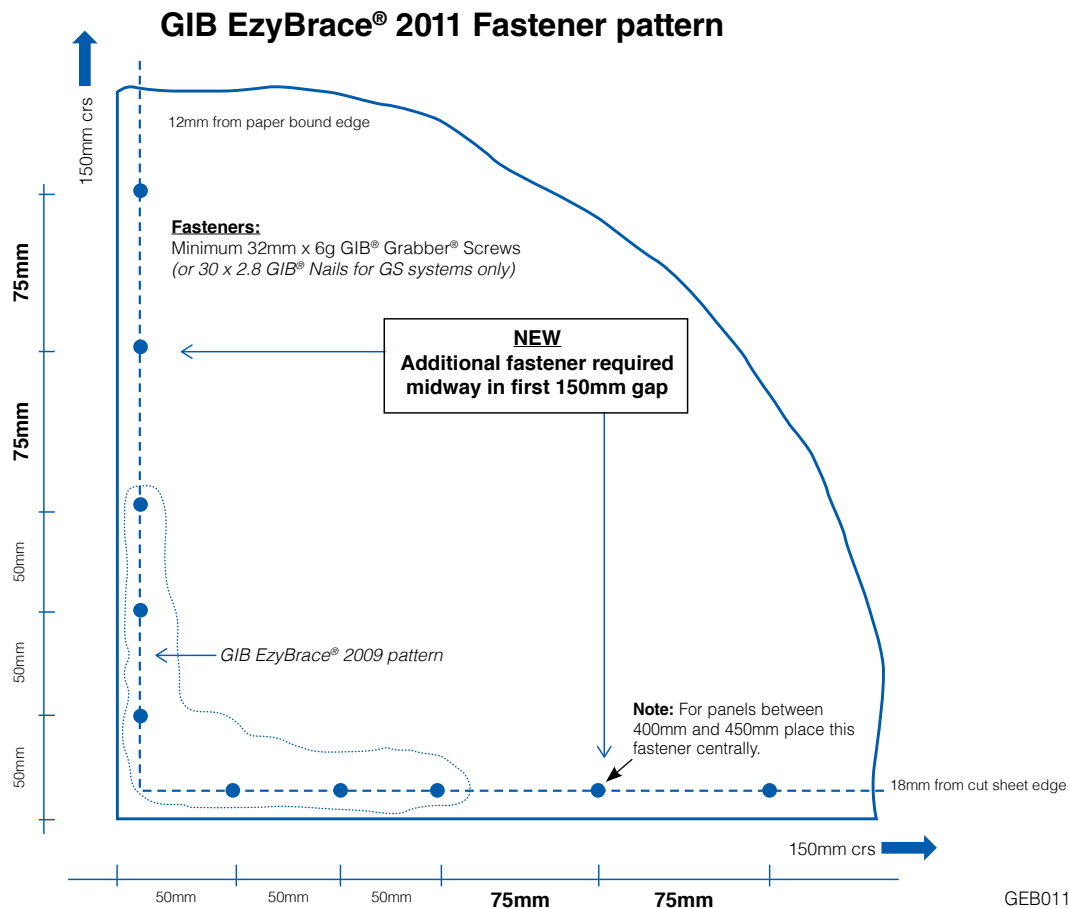
Refer to gib.co.nz/cad for CAD details.



Revised Fastener Pattern for *all four corners* of GIB EzyBrace® Elements

As GIB Braceline® screws are no longer required for BL bracing elements, two additional fasteners must be installed in ***all four corners*** of GIB EzyBrace® GS and BL elements, as shown.

Fasteners must be placed no closer than 12mm from the paper bound sheet edge and no closer than 18mm from sheet ends or cut edges.



Refer to gib.co.nz/cad for CAD details.

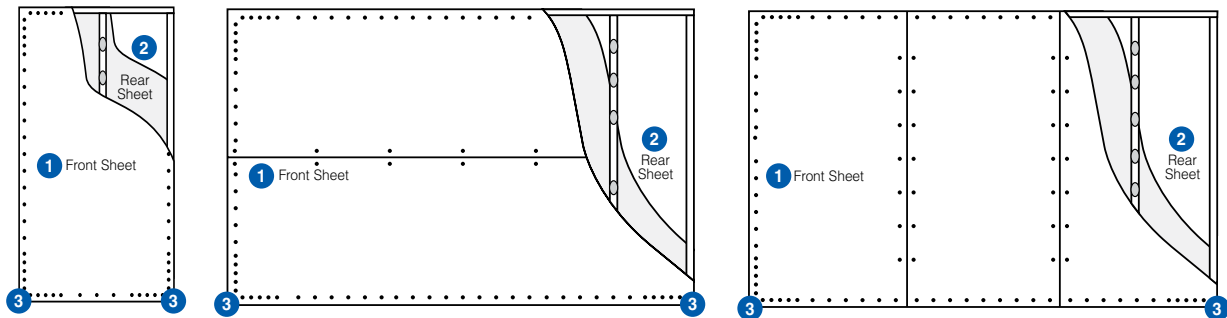
PERMITTED GIB® PLASTERBOARD SUBSTITUTIONS IN GIB EZYBRACE® SYSTEMS

GIB Ezybrace® Systems have been designed and tested using only the products specified. Occasionally additional properties may be required to be provided by a different GIB® Plasterboard product. The following table provides acceptable substitution options.

Specified	Permitted alternative GIB® Plasterboard products								
	GIB® Standard	GIB Ultraline®	GIB Braceline/ Noiseline®	GIB Aqualine®	GIB Toughline®	GIB Fyrelime®			
						10mm	13mm	16mm	19mm
GIB® Standard		OK	OK	OK	OK	OK	NOTE 2		
GIB Braceline®	X	X		NOTE 1	OK	X	NOTES 1 and 2		

NOTE 1 The element must be 900mm or longer. Use 32mm x 6g GIB® Grabber® drywall screws at **100mm** centres to the perimeter of the bracing element. The bracing corner fastening pattern, as illustrated above, applies to all four corners of the element. Panel hold-down fixings are required.

NOTE 2 The fastener type and length must be as required for the relevant FRR system but the fixing pattern must be as shown above.



System	Lining one side ①		Lining opposite side ②		Panel Hold-Down Fixings ③	Fastener spacing
	Lining	Fasteners	Lining	Fasteners		
GS1-N	Any 10mm or 13mm GIB® Plasterboard	30mm GIB® nails, or minimum 32mm x 6g GIB® Grabber® high thread screws	Not required	Not required	Not required	GIB® Plasterboard Corner fastening pattern as illustrated above Fasteners at 150mm to bracing element perimeter, and: - at 300mm centres to intermediate sheet joints for vertical fixing, or - at stud / sheet junction for horizontally fixed elements, and - GIBFix adhesive daubs at 300mm crs to intermediate framing
GS2-N			Any 10mm or 13mm GIB® Plasterboard	30mm GIB® nails, or minimum 32mm x 6g GIB® Grabber® high thread screws		
GSP-H			Minimum 7mm Ecoply manufactured to AS/NZS 2269	50mm x 2.8mm Flat head galvanised or stainless steel nails	Yes, see Pages 19 and 20	
BL1-H	10mm or 13mm GIB Braceline®	minimum 32mm x 6g GIB® Grabber® high thread screws	Not required	Not required		Plywood Fasteners at 150mm around the perimeter of every sheet and at 300mm centres to intermediate studs. Place fasteners no closer than 7mm from sheet edges. Plasterboard corner fastener pattern does not apply to plywood.
BLG-H			Any 10mm or 13mm GIB® Plasterboard	30mm GIB® nails, or minimum 32mm x 6g GIB® Grabber® high thread screws		
BLP-H			Minimum 7mm Ecoply manufactured to AS/NZS 2269	50mm x 2.8mm flat head galvanised or stainless steel nails		



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; AS1 Clause 3 Timber (NZS 3604:2011)
- NZBC B2 - Durability AS1 Clause 3.2 Timber (NZS 3602)

Framing dimensions and height as determined by NZS 3604 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 3.15 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 for external 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 SUBSTITUTION

For permitted GIB® Plasterboard substitutions refer to Page 21 in GIB Ezybrace® Systems 2011.

FASTENING THE LINING**Fasteners**

32mm x 6g GIB® Grabber® high thread screws; or 30mm GIB® Nails.

Fastener centres

50, 100, 150, 225, 300mm from each corner and 150mm thereafter around the perimeter of the bracing element.

For vertically fixed sheets place fasteners at 300mm centres to intermediate sheet joints.

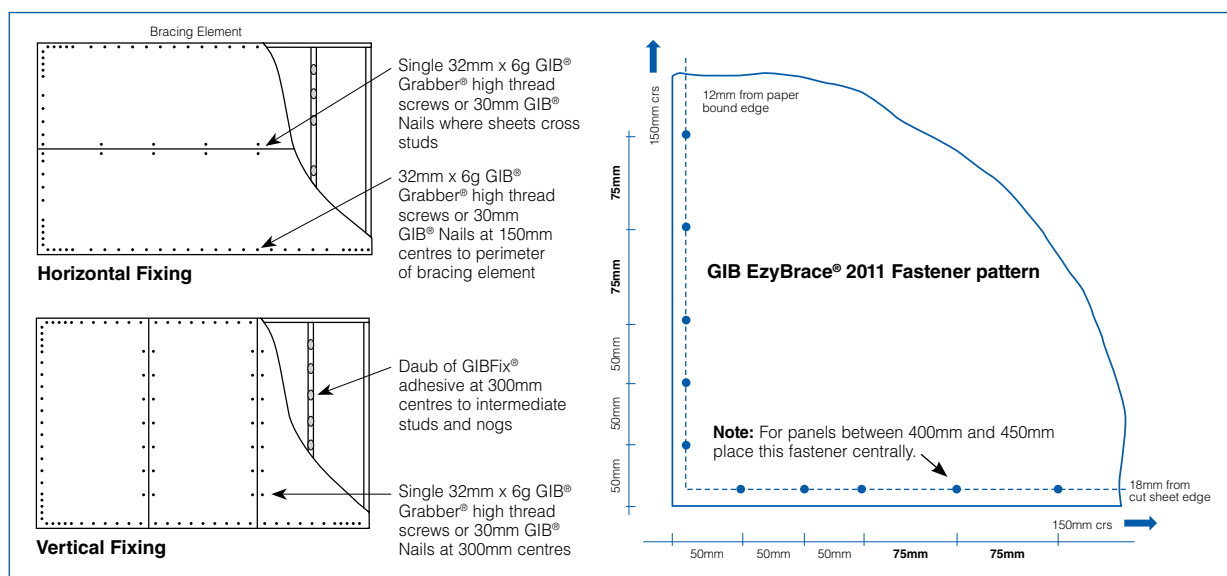
For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud.

Use daubs of GIBFix® adhesive at 300mm 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

All fastener heads stopped and all sheet joints paper 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 2011 and has been appraised in accordance with the BRANZ Appraisal No. 294 (2011).





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; AS1 Clause 3 Timber (NZS 3604:2011)
 - NZBC B2 - Durability AS1 Clause 3.2 Timber (NZS 3602)
- Framing dimensions and height as determined by NZS 3604 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 3.15 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

One layer 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 SUBSTITUTION

For permitted GIB® Plasterboard substitutions refer to Page 21 in GIB® Ezybrace Systems 2011.

FASTENING THE LINING**Fasteners**

32mm x 6g GIB® Grabber® high thread screws; or
30mm GIB® Nails.

Fastener centres

50,100,150, 225, 300mm from each corner and 150mm thereafter around the perimeter of the bracing element.

For vertically fixed sheets place fasteners at 300mm centres to intermediate sheet joints.

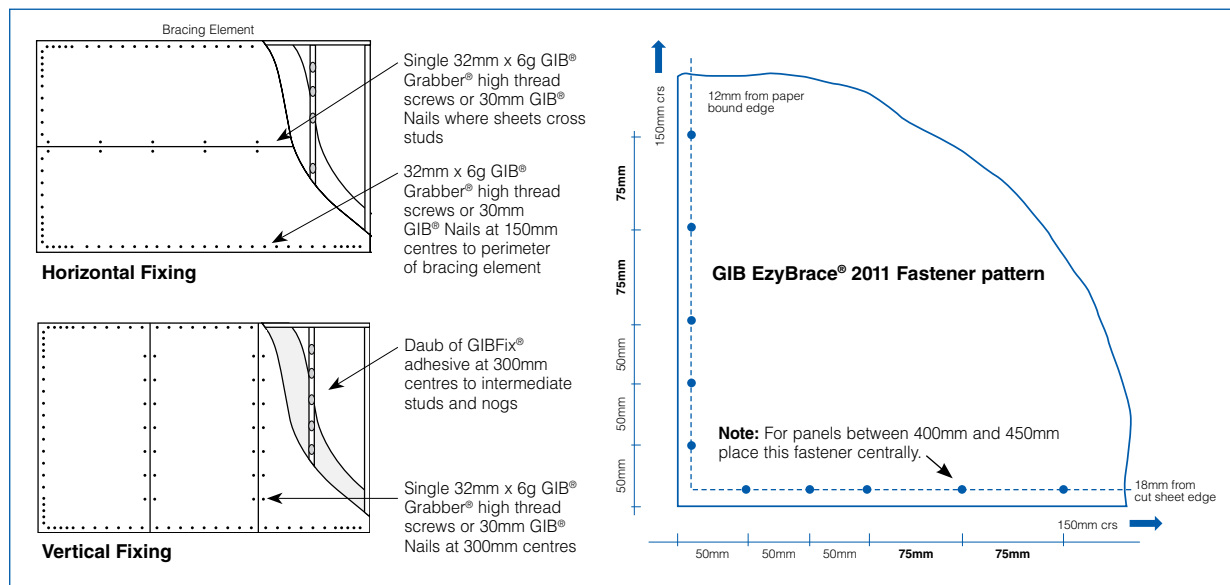
For horizontally fixed sheets place single fasteners to the sheet edge where it crosses the stud.

Use daubs of GIB Fix® 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.

JOINTING

All fastener heads stopped and all sheet joints paper 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 2011 and has been appraised in accordance with the BRANZ Appraisal No. 294 (2011).



WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
BC160644 24/06/2016 brendam

ECOPLY® SPECIFICATION & INSTALLATION GUIDE

SEPTEMBER 2015

2.0 GENERAL INSTALLATION GUIDE

The following is a general guide to be followed unless otherwise specified. For additional installation instructions for typical applications refer to sections 3, 4 and 5.

2.1 FRAMING

Use kiln dried framing e.g. Laserframe® in accordance with timber framing manufacturer's specifications and treated in accordance with NZS 3602. All timber frame sizes and set out must comply with NZS 3604 (or be specifically designed to NZS 3603). The current Laserframe Product Guide can be downloaded from www.chhwoodproducts.co.nz. Ecoply may be specified for frame spacing determined by design, or using tables in section 3 for specific product applications such as bracing, flooring and as a substrate for shingle roofs or membrane roofs and decks.

H3.1 LOSP treated framing should be vented before fixing and if construction adhesives are required (for example to screw and glue floor panels) the adhesive must be compatible with H3.1 LOSP. See section 1.4: Preservative Treatment.

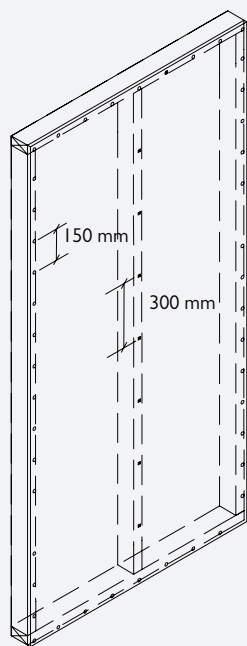
For plywood used as exterior cladding refer to the current Shadowclad® Specification & Installation Guide for Cavity Construction which can be downloaded from www.chhwoodproducts.co.nz

For plywood used as a rigid air barrier refer to the current Ecoply Barrier Specification & Installation Guide which can be downloaded from www.chhwoodproducts.co.nz

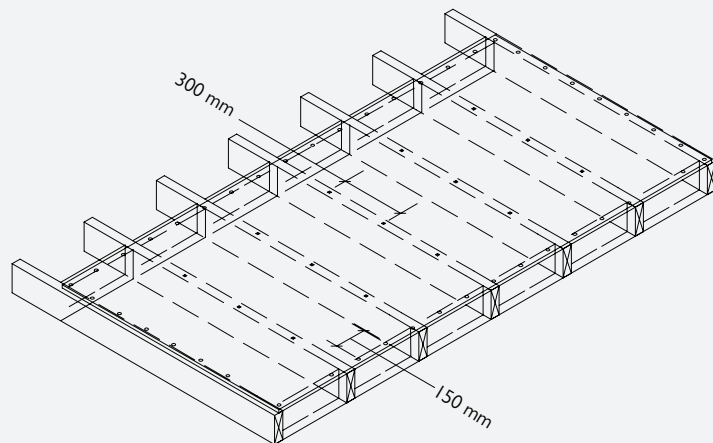
2.2 SHEET FASTENERS AND FIXING

- Where there is risk of panel size change due to changes in moisture levels, allow a 2 to 3 mm expansion gap between sheets
- Use only flathead nails or screws, with or without construction adhesives
- Fastener length should penetrate at least 10 nail diameters into the framing or be three times the sheet thickness, whichever is the greater. Longer or ring shank nails may be specified
- Fasteners must be at least 3 fastener diameters or 7 mm from the edge of the sheet
- For tongue and groove products such as flooring and roofing fasten 15 mm from tongue and groove edges
- Standard fixing pattern: unless otherwise specified fasten edges and ends of sheets at 150 mm centres, and within the panel at no more than 300 mm centres (see diagram below)
- Use hot dipped galvanised fasteners or corrosion resistant fasteners (i.e. stainless steel) determined by design for specific hazards
- Where using stainless steel nails, nails must be annular grooved
- Refer to Table 7 for minimum fastener sizes
- Do not overdrive power driven nails

EC001: Fastener spacings for Ecoply®



Ecoply® fastened in vertical plane



Ecoply® fastened in horizontal plane

EC002: Fastener spacings from edges

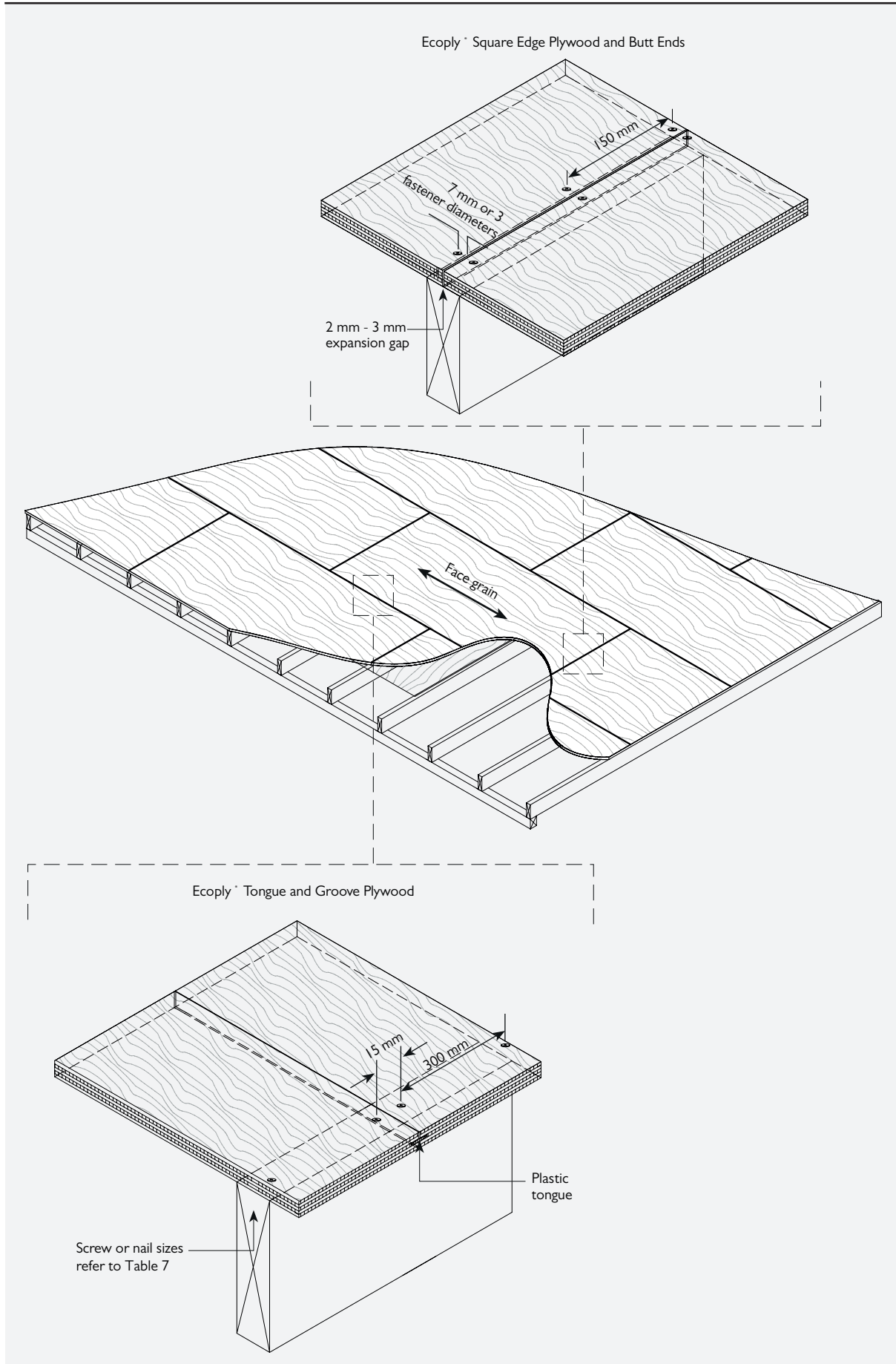


Table 7: Fasteners and Characteristic Shear Loads for Ecoply®

Nominal Thickness (mm)	7mm 9mm	Load ¹	12mm 15 mm	Load ¹	17 mm	Load ¹	19mm 21mm	Load ¹	25 mm	Load ¹
Minimum nail size in timber framing²	40 x 2.5 mm	570	60 x 2.8 mm	736	60 x 2.8 mm	736	60 x 2.8 mm	736	75 x 3.15 mm	883
Screw size in timber framing²	8g x 30 mm	1230	8g x 40 mm	1230	10g x 40 mm	1650	10g x 45 mm	1650	10g x 50 mm	1650
1.15 mm steel framing²	10-24-35 ⁴	1300	10-24-40 ⁴	2000	10-16-45 ⁴	2100	10-16-45 ⁴	2100	10-16-45 ⁴	2100
Screw size in 2.80 mm steel framing²	10-24-35 ⁴	1200	10-16-40 ⁴	1200	14-20-45 ⁴	3000	14-20-45 ⁴	4000	14-20-45 ⁴	5000

1 The load is the characteristic load (N) for one fastener in single shear

2 Characteristic load based on fixing into a timber of J5 joint group or better

3 Self tapping, self countersinking screw

4 Screw Numbers indicate: Gauge – Threads per inch – Length (mm)

Notes

- Steel thickness, screw sizes, characteristic loads, refer to assemblies actually tested
- Other screw sizes may be used. Screw properties vary between screw suppliers and the suitability of a particular size should be verified by the designer for performance under changing physical conditions and cyclic loading
- Non-standard nailing may be specifically designed with NZS 3603 or similar

Fasteners for H3.2 CCA treated Ecoply®

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 section 4 of NZS 3604 for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

Notes

H3.2 CCA treated timber should not be fixed in direct contact with light gauge steel products. Refer to the framing manufacturer for advice on fixing and treatments.

2.3 ADHESIVES

Tube applied construction adhesives

Site applied construction adhesives may be used together with nails and screws for non permanent loads, reduced fastener popping, and to lower the risk of squeaking in floors. Available types include polyurethane (e.g. Holdfast® Gorilla Nailpower®) and elastomeric (e.g. Bostik® Wallboard Gold) based adhesives.

Elastomeric adhesives should meet the requirements of APA Performance specification AFG 01 Adhesives for field gluing plywood to wood framing. Other types should have appraisal from an independent authorising body such as BRANZ or equivalent authorities for the specific applications proposed. Follow manufacturer's recommendations. In addition:

- Use a bead or daubs of adhesive as per manufacturer's recommendations
- Apply pressure using fastener patterns outlined in section 2.2: Sheet Fasteners and Fixing
- Work from the middle of the sheet outwards to develop glue line pressure
- Ensure adhesives are compatible with treatment in the framing timber; see section 1.4: Preservative Treatment

Structural adhesive joints

Structural bonds are generally only achievable in factory controlled conditions using approved structural adhesives in accordance with approved standards for glue lamination, e.g. Resorcinol formaldehyde joints made to AS/NZS 1328 Glued laminated structural timber. Site gluing is not recommended for structural plywood components. Contact CHH Woodproducts on 0800 326 759 for further information.

3.0 STRUCTURAL BRACING & CEILING DIAPHRAGMS

The Ecoply bracing system provides bracing resistance for walls and subfloor foundations for light timber framed buildings under wind and earthquake loading, to meet the requirements of the NZBC - B1 Structure, and NZS 3604 *Timber Framed Buildings* or specifically designed to NZS 3603 *Timber Structures Standard*.

Any Ecoply structural panel may be used for bracing as long as it is 7 mm, 9 mm or 12 mm thick, has a minimum wall length as described in Table 9, treated for the specific application in accordance with NZS 3602 (summarised in Table 8) and fixed in accordance with Ecoply bracing specifications outlined in this guide.

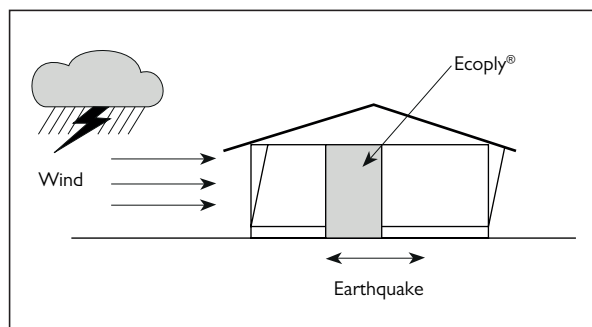
3.1 DESIGN TO COMPLY WITH THE NEW ZEALAND BUILDING CODE

Structure

Timber framed buildings to NZS 3604 *Timber Framed Buildings* is listed as an Acceptable Solution under Clause 3.0 Timber in Acceptable Solution B1/AS1 Structure.

CHH Woodproducts have developed a range of wall bracing elements tested using P21 testing methods referenced in NZS 3604.

Specific design



Ecoply structural plywood is manufactured to AS/NZS 2269, and it is suitable for design and use in earthquake and wind bracing systems constructed in accordance with NZS 3603 and AS/NZS 1170.

Structural plywood to AS/NZS 2269 is the only sheet brace material with properties defined in a published New Zealand engineering design code, NZS 3603 *Timber Structures*, and so can be designed in compliance with Verification method B1/VM1 under Clause 6.0 Timber for use in buildings over three storeys in height.

Demand is calculated by following section 5, Bracing Design of NZS 3604 or using the GIB EzyBrace® software, downloadable from www.gib.co.nz

EP bracing systems properties can be easily loaded into the EzyBrace software by way of an Excel patch downloadable from www.chhwoodproducts.co.nz together with loading instructions.

Timber Floors

When carrying out a bracing design for buildings with timber floor structures, the maximum bracing rating that can be accounted for when summing up the bracing units is 120 BUs/m. This does not exclude the installation of bracing elements that are rated higher than 120 BUs/m, however the extra bracing capacity can not be accounted for in the bracing design.

Specific design of floor and sub-floor framing is required for elements rated higher than 120 BUs/m.

Durability

Ecoply plywood is manufactured to meet the requirements of NZS 3602 *Timber and Wood based products for use in buildings*. If the product is used, handled and installed in accordance with CHH Woodproducts product literature it will meet the durability Clauses of the NZBC.

Table 8 summarises the applications in which Ecoply can be used as structural bracing together with the required preservative treatment and fastener material.

Table 8: Ecoply® Suitability for Bracing Applications Including Treatment Type & Fastener Material

Application	Plywood Treatment	Fastener Material
Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones as per section 4 of NZS 3604, including sea spray): E.g. Interior linings	Ecoply Untreated	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones B & C, as per section 4 of NZS 3604: E.g. Plywood bracing and/or rigid underlay (rigid air barrier), fixed to framing with/ without building paper/ wrap over, with/ without cavity battens behind cladding	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone D (sea spray), as per section 4 of NZS 3604: E.g. Plywood bracing and/or rigid underlay (rigid air barrier), fixed to framing with/without building paper/ wrap over, with/ without cavity battens behind cladding	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Rigid Air Barrier	Refer to Ecoply® Barrier Specification and Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones B & C, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in exposure zones' D	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones, as per section 4 of NZS 3604 (including sea spray)	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

Note: Power driven nails are suitable for use. Do not overdrive, nails must be full round head

Rain wetting and construction bracing

Untreated Ecoply will withstand normal exposure conditions during construction for up to 3 months however aesthetically the sheet appearance will deteriorate as the level of exposure increases. Rain and exposure can cause thinner plywood panels to buckle. Plywood stability is related to the number of veneers and thickness of the panel. Where panel stability is critical, consider using thicker panels.

Humidity and condensation

In conditions where the moisture content may exceed 18% for prolonged periods, Ecoply must be H3.1 LOSP or H3.2 CCA treated to resist decay or insect hazard.

Subfloor sheet bracing

H3.2 CCA treated Ecoply can be used as sheet bracing where dampness does not allow the use of untreated plywood or other sheet materials (section 5 of NZS 3604). Where Ecoply subfloor sheet bracing is exposed to both rain and sun, it must be coated with a three coat, 100% acrylic exterior coating system with a light reflectance value of 50% or greater.

Adjustments for wall height

Use section 5 of NZS 3604 to calculate bracing values:

"Adjustment of bracing capacity of walls of different heights and walls with sloping top plates shall be obtained by the following method:

- For wall bracing elements of heights other than 2.4 m, the bracing rating determined by test or from Table 9 should be multiplied by $2.4 \div \text{element height in metres}$, except that elements less than 2.4 m high shall be rated as if they are 2.4 m high.
- Walls of varying heights, should have their bracing capacity adjusted in accordance with section 5 of NZS 3604 using the average height."
- Walls with heights < 1.5m, Specific Engineering Design is required.

Joining panels for walls higher than maximum sheet length

Ecoply bracing panels must be fixed from top plate to bottom plate. For wall heights over 2.4 m, Ecoply and Shadowclad® is available in 2.7 m sheet lengths. Alternatively, a part sheet can be stacked above a full sheet, butt joined on a single row of nogs with each sheet/part sheet independently nailed off as per the nail spacing in the Ecoply bracing specifications (e.g. 2.4 m x 1.2 m sheet with a 0.3 m x 1.2 m part sheet above it to give a 2.7 m x 1.2 m bracing element).

Cladding as bracing

12 mm Ecoply (CD face grade or better) can be H3 treated to meet the requirements of Acceptable Solution E2/AS1 and will perform as a structural, durable and weathertight cladding and bracing element when installed in accordance with E2/AS1.

It should be noted smooth faced plywood such as Ecoply may be prone to appearance related issues such as face checking which occurs naturally and is not considered by CHH Woodproducts to be a manufacturing or product fault. For more information refer to section 1.8: General Design Considerations - Face Checks on Plywood Exposed to Weather. H3.2 CCA treated Ecoply may also have a green tinge to the wood surface and may have fillet marks on the face of the sheet.

Plywood for exterior cladding applications where a high visual appearance is desired, CHH Woodproducts recommends the use of Shadowclad as an exterior cladding. Shadowclad has a textured (bandsawn) face which reduces the visibility of face checking and is most commonly H3.1 LOSP treated (clear preservative treatment) which does not leave fillet marks on the panel face.

For further information on Shadowclad as an exterior cladding refer to the current Shadowclad Specification and Installation Guide for Cavity Construction which can be downloaded from www.chhwoodproducts.co.nz.

Soil

Ecoply must not be allowed to come in contact with soil. The bottom edge of the plywood sheet must be a minimum of 100 mm above decks or paved ground and a minimum of 175 mm above unprotected ground.

Service penetrations in bracing elements

Small openings (e.g. power outlets) of 90 x 90 mm or less may be placed no closer than 90 mm to the edge of the braced element, or waste pipe outlets of max. 150 mm diameter placed at no closer than 150 mm to the edge of the braced element.

3.2 ECOPLY® BRACING SPECIFICATIONS SUMMARY

CHH Woodproducts has a range of bracing specifications called the EP bracing series. The EP bracing series simplifies the design and construction of bracing elements using plywood, by itself or in conjunction with GIB® Plasterboard and features:

- Single sided and double sided bracing elements High performance bracing element utilising GIB® Standard plasterboard

- A single type, GIB Handibrac®, hold-down for all bracing elements
- Specifications for each bracing element type

Table 9: Summary P21 Ratings for 2.4m High Ecoply® Wall Elements

Specification No.	Minimum Wall Length	Lining Requirements	BUs/m Wind	BUs/m Earthquake
EPI	0.4 m		80	95
	0.6 m	Ecoply one side	95	105
	1.2 m		120	135
EPG	0.4 m	Ecoply one side and 10 mm GIB® Standard plasterboard other side	100	115
	1.2 m		150	150

Note: Bracing and other technical information has been specifically tested using Ecoply branded structural plywood. This information cannot be used with any other plywood brand and bracing data must be sought directly from the specific plywood manufacturer.

More information

The following pages provide a full specification of EP bracing elements. Copies of specifications can be downloaded from www.chhwoodproducts.co.nz

NZS 3604 provides the method of calculating demand on a building. Calculation sheets are available from BRANZ or GIB EzyBrace® software is available as a free download from www.gib.co.nz. Information is available at www.chhwoodproducts.co.nz which can be placed in the custom elements of GIB EzyBrace® for ease of calculation

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.

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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 or over cavity battens. 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, or 60 x 2.8 mm over cavity battens. 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.

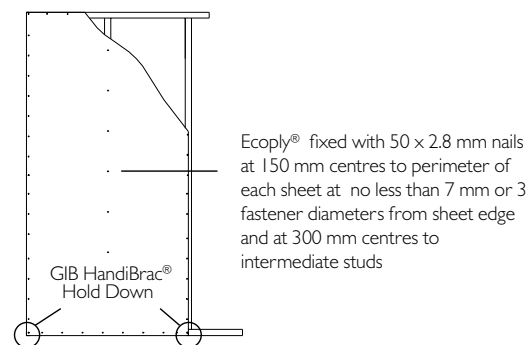
Fasteners for H3.2 CCA treated Ecoply® panels

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.



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/ASI 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.

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Table 11: Ecoply® Suitability For Bracing Applications Including Treatment Type and Fastener Material*

Application	Plywood Treatment	Fastener Material
Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones as per section 4 of NZS 3604, including sea spray):	Ecoply Untreated	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones B & C, as per section 4 of NZS 3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone D (sea spray), as per section 4 of NZS 3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Rigid Air Barrier	Refer to Ecoply Barrier Specification & Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones B & C, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in exposure zones D, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones (including sea spray), as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

* Refer to Table 8, page 16 of Ecoply Specification & Installation Guide.

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.

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3.4 ECOPLY® BRACING SPECIFICATION – EPG

Table 12: Structural Plywood Brace with Plasterboard Other Side

Specification No.	Minimum Wall Length	Lining Requirements	BU's/m Wind	BU's/m Earthquake
EPG_0.4	0.4 m	Ecoply one side and 10 mm	100	115
EPG_1.2	1.2 m	GIB® Standard plasterboard other side	150	150

Framing

Wall framing must comply with:

- NZBC B1 - Structure: AS1 Clause 3 Timber (NZS 3604)
- NZBC B2 - Durability: AS1 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

Side 1: One layer of 7 mm, 9 mm or 12 mm Ecoply plywood exterior wall cladding fixed directly to framing or over cavity battens. 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.

Side 2: One layer of 10 or 13 mm GIB® Standard plasterboard vertically or horizontally fixed. Sheet joints are touch fitted and fastener heads and joints stopped in accordance with the GIB® Site Guide.

Fastening the Ecoply® panels

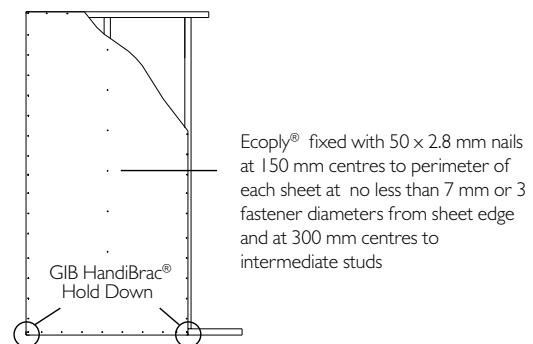
Fasten with 50 x 2.8 mm hot dipped galvanised or stainless steel flat head nails for direct fix, or 60 x 2.8 mm over cavity battens. Place fasteners no less than 7 mm or 3 fastener diameters from sheet edge and at 300 mm centres to intermediate studs. Screws cannot be used. Power driven nails are suitable. Do not overdrive, nails must be full round head.

Fasteners for H3.2 CCA treated Ecoply®

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.



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.

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Fastening the GIB® Plasterboard

32 mm x 6 g GIB® Grabber® Screws or 35 mm GIB® Nails

Fastening centres

Fasten 50, 100, 150, 225 and 300 mm from each corner and 150 mm thereafter around the perimeter of the bracing element. For vertical fixing place fasteners at 300 mm centres at intermediate sheet joints. For horizontal fixing place single fasteners in the tapered edge where sheets cross studs.

Place fasteners 12 mm from paper bound edges and 18 mm from cut sheet edges. GIB® plasterboard must be treated in every respect in accordance with relevant GIB® literature.

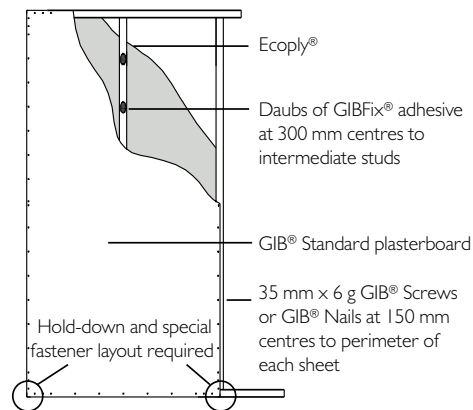


Table 13: Ecoply® Suitability For Bracing Applications Including Treatment Type and Fastener Material*

Application	Plywood Treatment	Fastener Material
Plywood bracing in interior spaces with no risk of exposure to weather or moisture penetration conducive to decay (all exposure zones including sea spray, as per section 4 of NZS3604):	Ecoply Untreated	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zones I B & C, as per section 4 of NZS 3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Hot dipped galvanised or better
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay in exposure zone I D (sea spray), as per section 4 of NZS3604:	Ecoply H3.1 LOSP/H3.2 CCA treated Ecoply Barrier (rigid air barrier)	Stainless steel
Rigid Air Barrier	Refer to Ecoply Barrier Specification & Installation Guide	
Bracing on framing exposed to ground atmosphere in exposure zones B & C, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Hot dipped galvanised or better
Bracing on framing exposed to ground atmosphere in exposure zone D, as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel
Bracing in wet process buildings in all exposure zones (including sea spray), as per section 4 of NZS 3604	Ecoply H3.1 LOSP/H3.2 CCA treated	Stainless steel

* Refer to Table 8, page 16 of Ecoply Specification & Installation Guide.

3.5 GIB HANDIBRAC® – RECOMMENDED INSTALLATION METHOD

Developed in conjunction with MiTek®, the GIB HandiBrac® has been tested for use as the hold-down in all EP bracing elements.

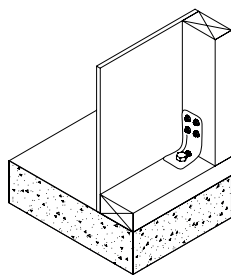
- The GIB HandiBrac® registered design provides for quick and easy installation
- The GIB HandiBrac® provides a flush surface for the wall linings because it is fitted inside the framing. There is no need to

check in the framing as recommended with conventional straps

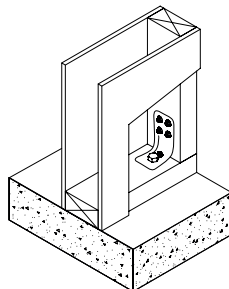
- The GIB HandiBrac® is suitable for both new and retrofit construction
- The design also allows for installation and inspection at any stage prior to fitting internal linings

Concrete Floor

External Walls



Internal Walls



Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate

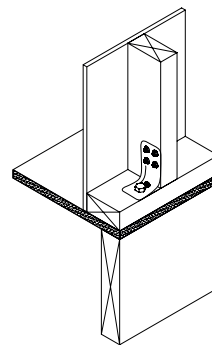
Position GIB HandiBrac® at the stud/plate junction

Hold-down fastener requirements

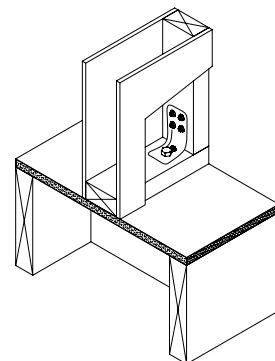
A mechanical fastening with a minimum characteristic uplift capacity of 15kN or screw bolt supplied with the bracket

Timber Floor

External Walls



Internal Walls



Position GIB HandiBrac® in the centre of the perimeter joist or bearer

Position GIB HandiBrac® in the centre of the floor joist or full depth solid block

Hold-down fastener requirements

M12 x 150 mm galvanised coach screw

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3.6 STRUCTURAL CEILING DIAPHRAGMS

Diaphragms are used to transfer lateral loads to braced walls and allow for greater spacing between bracing lines. Diaphragms do not have a BU rating themselves.

Plywood diaphragms are an acceptable solution as described in section 13 of NZS 3604 13.5.2 which allows for plywood not less than 6 mm thick and a minimum of three ply for:

- Diaphragms not steeper than 25 degrees to the horizontal and not exceeding 12 metres long under light or heavy roofs and;
- Diaphragms not steeper than 45 degrees to the horizontal and not exceeding 7.5 metres long under light or heavy roofs

Plywood ceiling diaphragms required to comply with NZS 3604 must be constructed as follows:

- The length of diaphragm shall not exceed twice its width measured between supporting walls
- The ceiling lining must consist of plywood over the entire area of the diaphragm
- Complete sheets with a minimum size of 1800 x 900 must be used
- Framing size and spacing must comply with NZS 3604
- Fastener size should comply with Table 7 of this guide. E.g. 40 mm x 2.5 mm flat head nails for 7 mm and 9 mm Ecoply
- Fastening is at 150 mm centres around the perimeter of each sheet and at 300 mm centres to intermediate framing
- Fixings are no closer than 10 mm from sheet edges
- Perimeter ceiling framing must be connected to wall framing by a perimeter 140 mm x 35 mm ribbon plate nailed to the top of the top plate or alternative such as a 0.55 mm thick steel angle or proprietary steel channel
- Sheets must be laid in a staggered pattern
- The basic shape of a ceiling diaphragm should be rectangular. Protrusions are permitted but cut-outs are not (see Figure 13.4 NZS 3604)

SECTION 4

H1 Calculations

Risk Matrix

H1 CALCULATION SHEET

LOT 4

non-solid construction

Zone 3

CALCULATION METHOD

	length	width	stud height
Proposed building dimensions	15.24	10.91	2.4
Total wall area	124.18		
Floor area	120.33		
Roof area	120.33		
Glazing area	27.55		
% glazing to wall area	22.18		
Actual wall area	96.63		
Area glazing over 30%	N/A		

REFERENCE CALCULATION (NZS 4218 R VALUES) ZONE 3

$$\begin{array}{ccccccc}
 \text{HL Reference} & = & \frac{120.33}{R3.3} & + & \frac{86.93}{R2.0} & + & \frac{120.33}{R1.3} & + & \frac{37.25}{R0.26} & + & \frac{N/A}{R0.31} & + & \frac{N/A}{R0.31} \\
 & & \text{roof} & & \text{wall} & & \text{floor} & & <30\% \text{ glazed} & & >30\% \text{ glazed} & & \text{skylights} \\
 & & 36.46 & & 43.46 & & 92.56 & & 143.27 & & & &
 \end{array}$$

Therefore HL Reference = 315.75

PROPOSED CALCULATION (PROPOSED R VALUES)

$$\begin{array}{ccccccc}
 \text{HL Proposed} & = & \frac{120.33}{3.4} & + & \frac{124.18}{2.1} & + & \frac{120.33}{1.3} & + & \frac{27.55}{R0.26} & + & \frac{N/A}{R0.31} & + & \frac{N/A}{R0.31} \\
 & & \text{roof} & & \text{wall} & & \text{floor} & & <30\% \text{ glazed} & & >30\% \text{ glazed} & & \text{skylights} \\
 & & 35.39 & & 59.13 & & 92.56 & & 105.96 & & & &
 \end{array}$$

(Area perimeter ratio 2.38)

Therefore HL Proposed = 293.04

☒ compliant

☐ non-compliant

10/4

Table 2: Building envelope risk matrix
Paragraph 3.1.2, Figure 1

Risk factor	Risk severity								Subtotals for each risk factor
	LOW	score	MEDIUM	score	HIGH	score	VERY HIGH	score	
Wind zone (per NZS 3604)	0		0		1	1	2		1
Number of storeys	0	0	1		2		4		0
Roof/wall intersection design	0	0	1		3		5		0
Eaves width	0	0	1		2		5		0
Envelope complexity	0		1		3		6		0
Deck design	0		2		4		6		0
Total risk score:									1

(Enter the appropriate risk severity score for each risk factor in the score columns. Transfer these figures across to the right-hand column. Finally, add up the figures in the right-hand column to get the total risk score.)

Table 2: Building envelope risk matrix
Paragraph 3.1.2, Figure 1

Risk factor	Risk severity								Subtotals for each risk factor
	LOW	score	MEDIUM	score	HIGH	score	VERY HIGH	score	
Wind zone (per NZS 3604)	0		0		1	1	2		1
Number of storeys	0	0	1		2		4		0
Roof/wall intersection design	0	0	1		3		5		0
Eaves width	0	0	1		2		5		0
Envelope complexity	0		1		3		6		0
Deck design	0		2		4		6		0
Total risk score:									1

(Enter the appropriate risk severity score for each risk factor in the score columns. Transfer these figures across to the right-hand column. Finally, add up the figures in the right-hand column to get the total risk score.)

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Number of storeys	0	0	1		2		4		0
Roof/wall intersection design	0	0	1		3		5		0
Eaves width	0	0	1		2		5		0
Envelope complexity	0		1		3		6		0
Deck design	0		2		4		6		0
Total risk score:									1

(Enter the appropriate risk severity score for each risk factor in the score columns. Transfer these figures across to the right-hand column. Finally, add up the figures in the right-hand column to get the total risk score.)

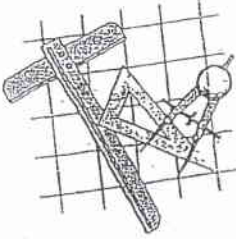
Table 2: Building envelope risk matrix
Paragraph 3.1.2, Figure 1

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	LOW	score	MEDIUM	score	HIGH	score	VERY HIGH	score	
Wind zone (per NZS 3604)	0		0		1	1	2		1
Number of storeys	0	0	1		2		4		0
Roof/wall intersection design	0	0	1		3		5		0
Eaves width	0	0	1		2		5		0
Envelope complexity	0	0	1		3		6		0
Deck design	0	0	2		4		6		0
Total risk score:									1

(Enter the appropriate risk severity score for each risk factor in the score columns. Transfer these figures across to the right-hand column. Finally, add up the figures in the right-hand column to get the total risk score.)

SECTION 5

Specifications



SPECIFICATION :

PRELIMINARIES
EXCAVATION
CONCRETE AND REINFORCING

BRICKLAYER
WINDOWS
CARPENTER
JOINERY
PLUMBER
DRAINLAYER
ELECTRICIAN
PAINTER
ROOFING CONTRACTOR
GAS SERVICE

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
BC160644 24/06/2016 brendan

DESIGNER : WAYNE WOBALL Ph. 03.3 7

INSURANCE OF WORKS:

The Contractor shall insure the works under a "Contract Works" insurance policy as commonly is in use in New Zealand. Such a policy and the insurer shall both be acceptable to the Employer.

The contractor shall effect insurance against earthquakes.

The Contractor shall effect insurance against fire.

VARIATIONS :

No variations of any kind shall be made to the contract without direct instruction in writing from the employer. The price of any variation must be agreed to in writing before being proceeded with.

SAFETY PRECAUTIONS:

Allow for complying with all requirements of the New Zealand Building Code.

POWER SUPPLY:

The contractor will arrange for the contractors power supply connection on site and arrange all necessary fees to be paid.

ATTENDANCE OF TRADES:

Make good after all trades. The contractor shall leave all necessary holes, chases, sleeves, ducts etc. as required by subsequent trades.

SETTING OUT:

Any discrepancy between work as set out and the drawings must be reported to the designer before any work is carried out. The contractor is responsible for the accuracy of the setting out.

The levels shown on the drawings are approximately correct but tenders shall verify these as no claims for extra will be allowed on the basis of incorrect levels shown.

INTERPRETATION:

Work or materials shown on the drawings or specified and not shown, must be supplied as though both shown and specified. Materials shown but not specified must be of the kinds commonly employed for the service they are intended to perform and shall be the best of there respective kinds, qualities, classes, and grades and shall be in compliance with the NZBC. All figured dimensions shall be taken in preference to scale. The Contractor shall be held responsible for the setting out of work and he shall make good at his own expense any errors that occur through his lack of checking or faulty workmanship.

SCAFFOLDING:

Allow for the provision and the erection of all external and internal scaffolding required , allowing the free use of the same to all tradesmen engaged in the works, maintaining to the satisfaction of the authorities and removing at the completion.

FINISHED WORK:

It should be clearly understood that a high standard of workmanship and finish is required throughout the contract: Should any trade consider that any surface finish or fitting be not in a satisfactory condition to ensure a proper fitting for his own before anything further is done, and under no circumstances what ever shall such finishing work be proceeded with until the necessary improvements have been made. Failing such notification and correction, the finishing Trade concerned will be held responsible for a poor finish due to such unsatisfactory conditions.

Ensure the site is fenced during construction to safeguard people from injury and other property from damage, caused by construction or demolition site hazards.

EXCAVATOR

PRELIMINARY AND GENERAL:

Note Preliminary and General clauses apply to this trade.

ALLOWANCE OF TENDER:

Allow for foundation depths as shown on the drawings. If there are to be any variations from dimensions shown there is to be prior written notice given.

SETTING OUT:

Set out the work as shown or implied on the drawings. Check accuracy in terms of position, levels and square.

BACKFILLING:

Backfilling around foundations with approved material and thoroughly consolidate. Remove all timber and other rubbish and loose material before backfilling.

Spread top soil over backfill and leave suitable for sowing grass.

HARDFILL:

Hardfill shall consist of 40mm rounds well consolidated.

REMOVAL OF SPOIL:

The excavator shall remove all surplus material away from the area of the building. Stockpile on the site where directed by the owner.

CONCRETOR

GENERAL:

Read and note all clauses under Preliminary and General of this Specification where they apply to this trade.

MATERIALS AND WORKMANSHIP:

The whole of the concrete work shall comply with the New Zealand Building Code and the relevant New Zealand Standards.

CONCRETE STRENGTH:

25 mPa @ 28 days

FORMWORK:

The formwork and the false work shall be constructed to provide a high standard of "fairface" finish. The surface to steps in entry ways are to have a wood float finish to comply with the N.Z.B.C. D1/AS1

REINFORCING:

The reinforcing steel shall comply with the following requirements:

(A) H12 steel reinforcing (Deformed); D10 @ 300 crs stirrups
D10 slab ties @ 600 crs
FLOOR SLAB: Refer: 'Ribcraft design' (engineers)

(A) Damp proofing:

Lay 0.25mm minimum polythene, lap joints 150mm and seal with pressure sensitive tape.

(B) Floor slab:

The concrete floor slab laid over the Barrier and pod system
(as specified on the plans.)

(C) Floor Finish:

The slab shall be finished while still green. Any resulting ridges shall be trowelled off with a steel float. A high standard of finish is expected. Allow to fill and finish with a steel float all pockets, recesses, chases, etc. left for pipework and other trades.

(D) Shrinkage Control Joints:

Provide shrinkage control joint as indicated on engineers details

CHASES ETC:

Form all chases, pockets, flashing grooves etc as are necessary for the complete and proper execution of the work.

EMBEDDED ITEMS

To foundations build in M12 holding down bolts at 1200mm crs max and 300mm crs from corners or M12 Truebolts at 900mm crs max.

BRICKWORK**PRELIMINARY AND GENERAL:**

Read and note all clauses under Preliminary and General of this Specification where they apply to this trade.

GENERAL

Brick veneer shall be built in accordance with NZS 3604/2011 and NZS 4210P 1981 Code of Practice for Masonry Buildings

SCOPE

The laying of bricks to House and Garage.

Bricklayer to supply all: mortar, galvanized steel angles at lintels, and ties.

MATERIALS

Bricks shall be 70mm series (Clay type)

Cement for mortar shall be ordinary Portland Cement.

Sand for mortar shall comply with NZS 3103:1976 Sands for Mortars.

Plasticizer for mortar shall be followed exactly to the manufacturers instructions.

Water shall be of drinking quality and free from impurities.

Mortar shall be colored to match bricks and composed of one part cement to one part lime to four parts of sharp sand mixed for not less than five minutes. All mortar shall be used within 90 minutes of mixing.

WORKMANSHIP

Work shall be carried out by expert bricklayers & only the highest standard of workmanship will be accepted.

Bricks shall be laid fairface, stretcher bond, and perpends kept true.

Provide weep holes vertical at every third brick at bottom course and similar ventilation slots at top row of bricks next to soffit lining.

Care shall be taken to prevent mortar droppings from falling into the cavities.

Joints shall be tooled to a concave shape.

Brickwork shall overhang foundation by 10mm and butt up to all window and door frames.

Fix galvanized ties to timber framing at every 4th course and spaced out along the course at 600mm intervals as work proceeds. If over size bricks are used fix ties @ every 2nd course

On completion clean down and make good around pipes and vents etc. penetrating the brickwork.

METAL WINDOWS AND DOORS**PRELIMINARY AND GENERAL:**

Read and note all clauses under Preliminary and General of this Specification where they apply to this trade.

GENERAL

Workmanship and materials shall where applicable comply with NZS 4211 and NZS 504.

MATERIALS

Windows and doors shall be aluminum with epoxy powder coat finish, colour to be (see Owner).

Timber reveals shall be ex 25mm and be of selected H3 Radiata having joints mitred at corners. grooved to receive wall linings.

All sill sections to have condensation channels.

HARDWARE

Each sash shall have two toungeless nylon wedge fasteners.

Friction stays shall be Interlock or similar approved.

Entry door to have keyed lockset. awning Garage door to have a patio locksets.

WANZ support bars to be used.

GLAZING

All windows to be double glazed.

Glass to aluminum windows and doors shall be sized, supplied, and fitted by window manufacturer all to AS/NZS 4666 together with NZS 4223 Part(1) & Part(3)

Obscure glass at all bathroom windows shall be Pacific pattern.

Safety glass as required.

ENTRY DOOR

Front Entry door shall be timber in alloy frame. approx size 1980 x 860mm flush paneled door.

CARPENTRY**PRELIMINARY AND GENERAL:**

Read and note all clauses under Preliminary and General of this Specification where they apply to this trade.

GENERAL

Workmanship and materials shall comply with NZS 3604: 1999 Timber Framed Buildings. All finished work shall be protected from discoloration, surface injury or other damage.

MATERIALS

All timbers shall be of the grades and qualities scheduled, where applicable, to comply with NZS 3631.

Nails, screws and other fastenings, shall be the best of their respective kinds

Nails in exposed timber shall be punched.

PRESERVATIVE TREATMENT

Treated timbers shall be treated and branded in conformity with TPA Commodity Specification Copper Chromium Arsenate Type,

MOISTURE CONTENT

Timbers shall be seasoned to the following moisture content:

Framing Timbers	Kiln Dried
Exterior Finishing's	14- 18%
Interior Finishing's	10- 14%

GAUGING

All framing timbers shall be : 90 x 45mm.

DAMP PROOF COURSE

Lay a 3 ply bituminous fabric between all timbers in contact with concrete.

SCHEDULE OF TIMBERS

Wall framing :	NZO or	Framing Pinus Radiata	H1.2	MSG 8
Roof Framing	NZO or	Framing Pinus Radiata	H1.2	"
Purlins	" "	" "	H1.2	"
Fretwork		Selected Radiata	H3.2	
Skirting etc.		Customwood	Nil	

WALL FRAMING

Plates shall be in long lengths. use nail plates at all connection points.

Frame up walls with 90x45 studs at 600mm crs. Cut in dwangs at 800mm crs to suit linings.

Brace walls with "Gib. ezy brace system" bracing where indicated on the bracing schedule. (Refer gib bracing manual)
Other bracing : 7.5 structural Gcopy (H3.2) (Use stainless nails)
10mm brace line gib.

ROOF FRAMING

Pitched roofs shall be framed up with Gangnall type trusses at 900mm c/s max. : *M4GB*

Licensed manufacturer to supply a truss layout plan and producer statement to the Builder.

Fix trusses to top plate with pair of galv Z nails. (*per connection*)

Fix 70 x 45 purlins at 900 c/s max. *use (H1-2)* Fixing (1) 10g x 80 self drilling purlin screw
'Bitumac' 750 self supporting underlay.

CEILING FRAMING

At all ceilings fix 70 x 35mm battens at 400mm c/s. packed to provide a true level surface for fixing of 10mm gib ceiling linings.

EXTERIOR WALL COVERINGS

(i) Building Paper:
Line over all wall framing with 'Tekton' building wrap

(ii) Hardiflex:
Fix 4.5mm hardiflex to all soffits.

INSULATION

At exterior walls fit R 2.6 batts at brick veneer. Fit R2.6 batts at Garage/House internal wall.

Fix R3.6 fibreglass batts to all ceilings.

INTERIOR LININGS

(i) Gibraltar board.
Generally line all interior framed timber walls with 10mm gib board and ceilings with 10mm gib board.

Use 10mm Gib Water Resistant board at all wet areas. (*Aqualine*)

Generally lay sheets horizontally and loosely butt sheets and plaster to a smooth finish suitable for a paint finish. Use only Winstones gib bedding compound and finishing compound.

All joints to be taped including cornice, with exterior corners to be reinforced with Beadex angles.

Fix all types of gib board as per manufacturers instructions for that particular product. Note extra fixing straps required at bracing panels.

INTERIOR FINISHINGS

Provide and fix all necessary skirtings, architraves and mouldings etc. type to be discussed with owner.

HARDWARE

Door stops, toilet roll holders, door furniture and hardware etc. shall be supplied by the Builder.

GARAGE DOOR

Door jambs and heads shall be ex 170 x 40mm *H3.2 (or size to suit)*

Site measure doors before manufacture. Owner to choose colour of colorsteel cladding.

ROOFING CONTRACTOR**PRELIMINARY AND GENERAL:**

Read and note all clauses under Preliminary and General of this Specification where they apply to this trade.

WORKMANSHIP AND MATERIALS:

Lay building paper over purlins having 150mm laps running parallel to ridge, and discharge into spouting.

Roofing shall be 0.4mm BMT x G25 X Z400 Colorsteel G2 or similar (*Baker builder*)

Ridge, hip, valley flashing shall be 0.55 BMT Colorsteel G2 standard ridge flashings. Ridge and hip flashings shall be alloy edged.

All roofing and flashings of the like are to be fitted in accordance to the manufactures specifications

CLEANING:

Brush down roofing with a soft brush to remove any offcuts, fillings etc., to prevent staining of the prefinished surface.

DOWN PIPES SPOUTING AND FASCIA:

Metaline

Diamond, Oakleys or Klass to supply and fix coloursteel FASCIA and gutter system. Colour to be chosen by the owner.

Provide plain Fascia gutter with fall to down pipes.

Down pipes to be 0.55mm 75 x 50 mm rectangular coloursteel fixed with coloursteel straps.

JOINERY

PRELIMINARY AND GENERAL:

Read and note all clauses under Preliminary and General of this Specification where they apply to this trade.

FINISH:

Timbers shall be machine dressed on four sides and machine glass papered to exposed surfaces.

DOOR FRAMES:

Interior door frames shall be Customwood flat jambs 25mm thick and fitted with 12mm plant on stops (unless the owner changes this).

DOORS:

All interior doors shall generally be 1980 x 810mm suitable for a paint finish.

Pre-hang interior doors on 1 1/2 pair 90mm butts

1980 x 810mm panelled entry door to be chosen by the Owner. Carpenter to supply to Aluminium window Manufacturer.

KITCHEN JOINERY:

Joinery shall be designed, manufactured and installed by a firm specialising in this type of work, although if the layout of the kitchen is to change the kitchen design is to insure it is comply with the New Zealand Building Code G3/AS1.

Bench top shall be Formica with 36mm round front edge, cove up stands with opening for sink.

Construct kitchen from white melteca board for frames and shelves, coloured melteca to cupboard door and drawer fronts and edges. *Note: lacquered paint finish may be preferred.*

Pantry to have 6 melteca shelves.

BATHROOM VANITY:

To be constructed as for kitchen joinery.

PLUMBER

PRELIMINARY AND GENERAL:

Read and note all clauses under Preliminary and General of this Specification where they apply to this trade.

GENERAL

Sanitary plumbing shall comply with G12 & G13 of NZ Building Code.

MATERIALS

Copper tubing shall be cold drawn to comply with NZS 3501. All hot water to be run in Dux Secura plumbing system.

PLASTIC PIPE

- (i) Wastes, terminal vents, vent and soil pipes shall be rigid PVC to comply with NZS 7641 and 7642.
- (ii) Traps shall be polypropylene
- (iii) Polythene underground supply 25mm
- (iv) Polybutylene (Cold water inside house)

WORKMANSHIP

All piping shall be securely fixed to framing to adequately support prevent vibration and shall be concealed in all cases.

FLASHINGS

Where pipes penetrate roof use Dektite neoprene type seals.

DOWNPIPES & SPOUTING

Spouting to be 125 "D" profile with internal brackets fixed at 900mm c/s max.

Downpipes to be 0.55mm 75 x 50mm colorsteel.

COLD WATER SERVICE

Connect up to new water main @ street and run 25mm underground supply to house.

Provide two brass bar outside hose taps.

HOT WATER SERVICE

Connect Rinnai 26 or similar califont to gas system with controllers to bathroom ensuite & master to kitchen.

Relief pipes to be copper.

Pipe out in 20mm with 15mm branches to all fittings.

TAPS

All to be supplied by the Builder. Allow to fix.

VENTS

Vents shall be solvent sealed PVC domes.

WASTE PIPES AND TRAPS

All traps shall be screwed polypropylene. Wastes shall be solvent welded PVC.

All traps shall be 40mm dia.

SANITARY FITTINGS

All fittings will be supplied by Builder. Allow to connect up.

DRAINAGE**PRELIMINARY AND GENERAL:**

Read and note all clauses under Preliminary and General of this Specification where they apply to this trade.

WORKMANSHIP AND MATERIALS:

All work shall comply with G13 & E1 of the N.Z.B.C.

Storm water and sewer pipe shall be 100mm UPVC.

Concrete shall be 17 Mpa to N.Z.S. 3109, Specification for Concrete Construction.

TRENCHES:

Cut trenches, graded to falls and after approval backfill and thoroughly consolidate.

Lay drains on 100mm of crushed metal and haunch to centre line, after testing cover pipes to 100mm from top of pipe with crushed metal. (Minimum gradient 1:20.)

SEWER DRAINS:

Provide and install all necessary bends, inspection eyes, junctions, etc, and run drains as shown on the site plan to connect into existing sewer.

STORM WATER DRAINS:

Provide all necessary bends, junctions, and inspection eyes, and connect into existing that discharge to

Haunch drains to centre lines with crushed metal as for sewer drains.

ELECTRICIAN

PRELIMINARY AND GENERAL:

Read and note all clauses under Preliminary and General of this Specification where they apply to this trade.

SCOPE:

The complete installation and its execution shall comply totally with the N.Z Electrical Safety Regulations 1993, Electrical Codes of Practice, all Electrical Supply Authority regulations and other regulations governing the work involved. Conceal all wiring in framing, Electrician is to supply certifying certificate on completion.

MAINS:

Make all necessary connections to the local authority main, all wiring shall be underground within the site boundary.

Allow to provide temporary power to site for construction.

METER BOX:

Provide and install a galvanised 600 x 400mm meter box where decided with the owner but making sure not to be in a fire wall.

FINISH:

Particular care shall be taken with this section of work, as nothing but a high class finish shall be accepted.

SETTING OUT:

The Electrician shall sit down with the owner and discuss how many points, lights, 2 way switches etc are to be done and price the contract on this.

When frame up is complete the Electrician shall walk through with the owner positioning the points, lights etc.

TELEPHONES SECURITY & TELEVISION

Discuss all these items with the Owner and make allowances for them in the pricing.

APPLANCES:

To be supplied by the owner.

PAINTER

PRELIMINARY AND GENERAL:

Read and note all clauses under Preliminary and General of this Specification where they apply to this trade.

GENERAL

All work shall be carried out by a specialist firm of tradesmen painters in accordance with AS/NZS 2311 2000 Guide to Painting of Buildings.

Protect floors, etc, from paint droppings.

SCOPE

Paint complete interior and exterior of House and Garage.

MATERIALS

All primers, sealers and undercoats must be those recommended by the manufacturer of the finishing coats. Use only Resene paints.

WORKMANSHIP

Colours shall be as chosen by the owner.

At completion clear marks and spots off all surfaces.

PREPARATION OF SURFACES

Surfaces shall be dry, clean, smooth and rubbed down before painting and between coats.

EXTERIOR WORK

- (i) Hardiflex soffits and exposed timbers;
Apply two coats of Resene Lumbersider.
- (ii) New Timber ie. ~~Garage~~ door frame, front doors
Prime with enamel, one enamel undercoat, and two coats of full gloss enamel.

INTERIOR WORK

- (i) Gibraltar Board:
Seal with one coat Resene Surseal sealer.

Paint walls with two coats of Low Sheen vinyl acrylic.

Paint ceilings with two coats of flat Ceiling Paint.

Paint walls/ceilings of Bathrooms and Laundry with two coats of *semi gloss* enamel or approved acrylic.

- (ii) Timber to be painted: ie skirtings, architraves, doors
Give one sealing coat of Quick Dry, one enamel undercoat and two coats of semi-gloss enamel.

TILING.

Concrete floors to be tiled shall be rendered with sand-cement-ABACRETE render to a wood float finish. BC160644

Timber framed walls to be tiled shall be clad in Hardies 9mm Villaboard.

Prime walls and floors with ABA Multiprime and waterproof with 2 coats of paint-on Superflex waterproofing membrane.

Use compatible Ardex tile adhesive. (Aba Optima tile to membrane adhesive)

Tiles shall be laid with all top surfaces flush and consistent grout widths.

Grout with ABA Flexgrout Ultrasmooth in a selected colour.

See Ardex literature for more details regarding tiling.

Wet Areas : Bathroom; Ensuite; Laundry; WC

Areas to walls not tiled to be clad with '10mm gib aqualine' finished with (1) undercoat (oil based)

(2) top coats oil based enamel or equivalent

Floors to be tiled : Kitchen; Bathroom; Ensuite; Laundry; WC & Entry

GAS SERVICE

PRELIMINARY AND GENERAL:

Read and note all clauses under Preliminary and General of this Specification where they apply to this trade.

STANDARDS:

Ensure complete system is to the NZBC G10 requirements and all other applicable N.Z standards.

MATERIALS AND WORKMANSHIP:

All materials shall be of the best of their respective kinds. All plant shall be of the appropriate type to produce the required standard of workmanship and shall be installed by the relevant registered gas fitters and a Gasfitting Certification Certificate be left with the Owner. All materials and workmanship shall fully comply with the Specification listed herein.

SCOPE:

This section of the contract consists of the supply and installation of the Gas services, namely:

- a) The two 45kg Gas Cylinders on the concrete slab as installed by the builder.
- b) to the cylinders, provide an automatic change over valve, complete with all safety and isolating devices.
- c) Run gas lines from the cylinders to the various fixtures as listed below.
- d) Relevant testing and certifying of the complete system.
- e) Provide the owners with the necessary information of operation along with ensuring that the replacement cylinders are put on the normal delivery / replacement system.

FIXTURES:

Hot water:

Infinity 24 External model, complete with digital controllers, one to Ensuite and one to Bathroom. The Gas Appliance provider will advise further.

Kitchen Hob:

There will be one four ring gas hob in the kitchen.

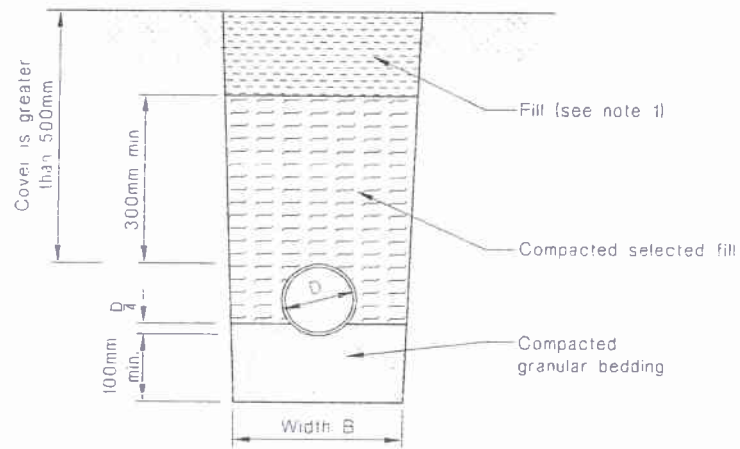
SECTION 6

Technical Information

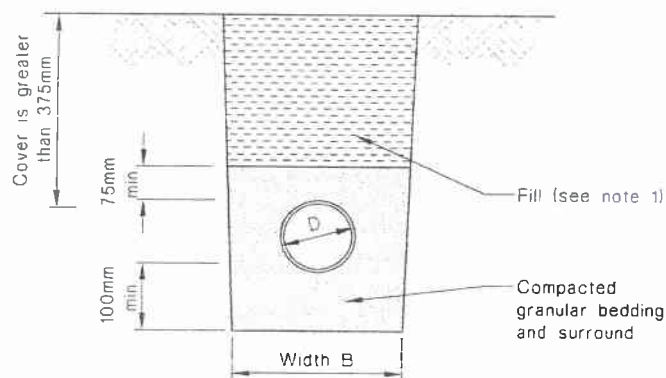
(Manufacturer's Information)

- ~~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~~

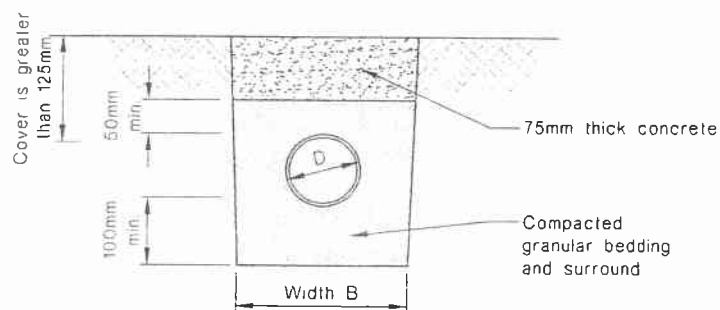
Figure 13: Bedding and Backfilling
Paragraphs 3.9.2, 3.9.4 and 3.9.5



(a) Cover greater than 500 mm
Bedding type 'B' of NZS 4452



(b) Cover greater than 375 mm
Bedding type 'D' of NZS 4452



(c) Cover greater than 125 mm

NOTE

1 Fill shall be

-Ordinary fill where drains are located below gardens and open country

-Compacted selected fill where the drains are located below residential driveways and similar areas subjected to light traffic

Amend 1
Sep 1993

Amend 1
Sep 1993

Amend 1
Sep 1993

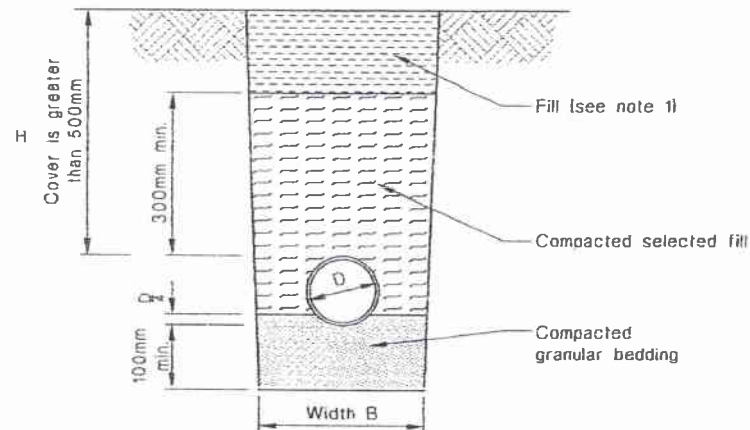
Amend 1
Sep 1993

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Sep 1993

Amend 1
Sep 1993

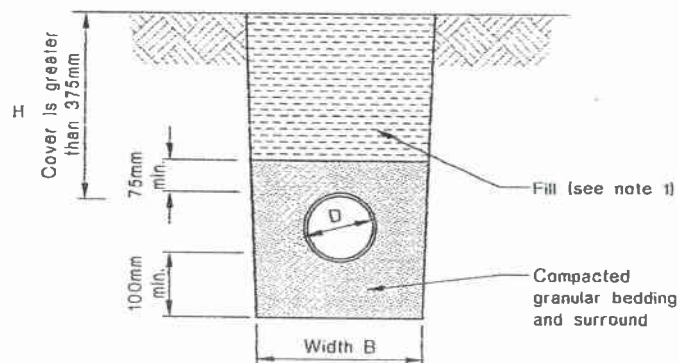
Figure 7: Bedding and backfilling

Paragraphs 5.2.1, 5.3.1 and 5.4.1



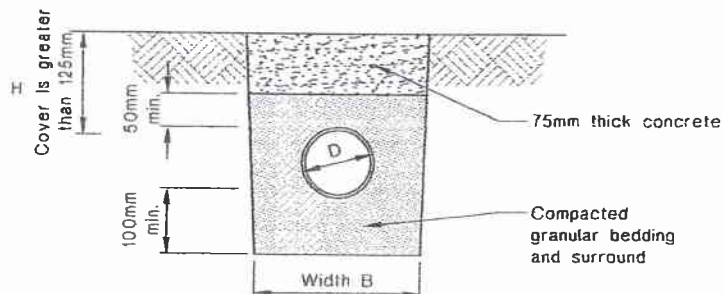
(a) Bedding type 'B' of NZS 7643

Cover greater than 500mm



(b) Bedding type 'D' of NZS 7643

Cover greater than 375mm



(c) Cover between 125mm and 375mm

NOTE:

1. Fill shall be:

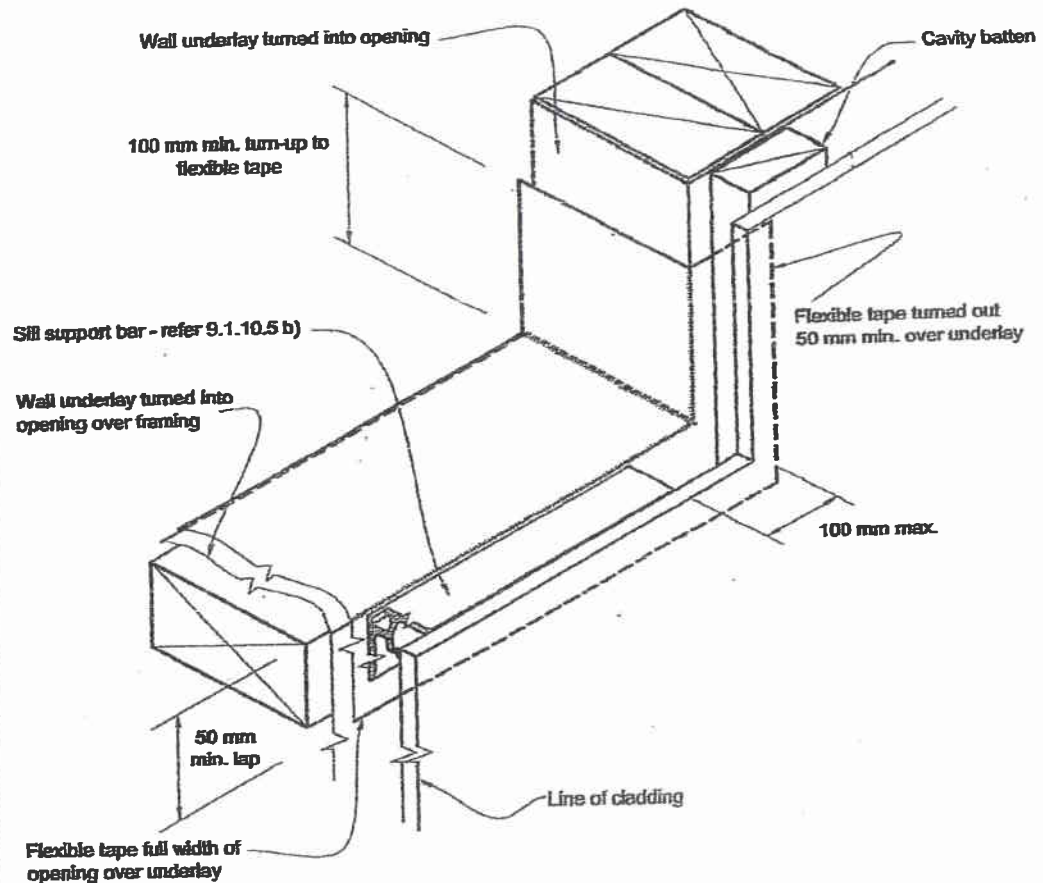
-Ordinary fill where drains are located below gardens and open country.

-Compacted selected fill where the drains are located below residential driveways and similar areas subject to light traffic

Figure 72B: General window and door opening with drainage cavity.
 Paragraphs 9.1.5, 9.1.5.2, 9.1.10.2, Figure 72, 75, 85, 88, 91, 93, 115 and 128

NOTE:

- (1) Detailed cladding omitted for clarity, refer to specific claddings.
- (2) Head to be treated similarly with continuous wall underlay and flexible tape at corners.
- (3) Refer individual cladding details for jamb flashings.



Errata 2
Dec 2011

Amend 5
Aug 2011

WAIMAKARIRI DISTRICT COUNCIL
 Plans and specifications APPROVED in accordance
 with the Building Act 2004, clause 49 and the Building
 Regulations 1992, Clause 3
 BC160644 24/06/2016 brendam

Consent Issued BC160644

CBI 5113

July 2015

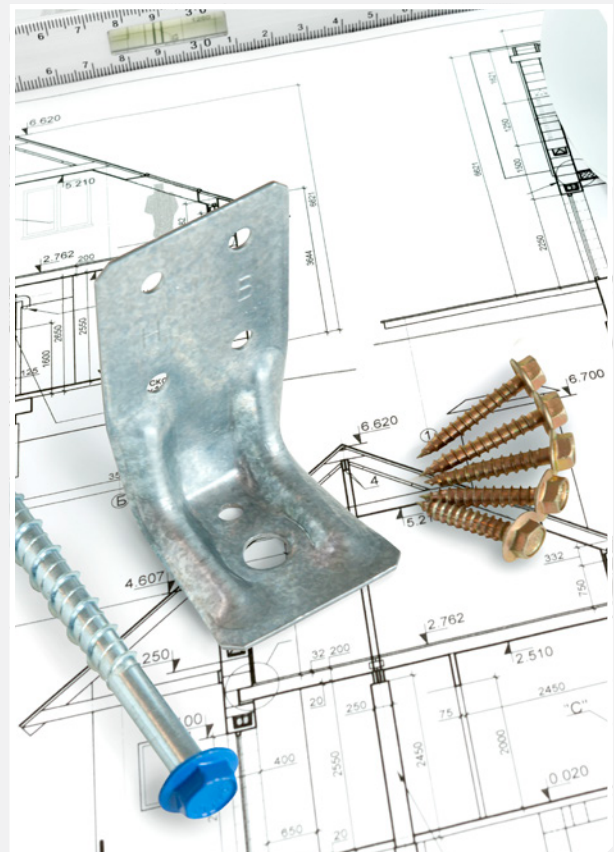
GIB HandiBrac[®]

Panel Hold-Down Bracket

**NEW GIB
HANDIBRAC[®]
UPDATES
INSIDE**

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
BC160644 24/06/2016 brendam







GIB HANDIBRAC® OVERVIEW

COMPONENTS

GIB HandiBrac® is available in boxes of 10, each containing 5 pairs.

Components per paired pack include:

- 2 x GIB HandiBrac® Brackets
- 10 x Tek Screws
- 2 x BOWMAC® screw bolts included within specific GIB HandiBrac® pack

GIB® BRACING ELEMENTS

The GIB HandiBrac® is a proprietary product that has been tested and is suitable for use with specified GIB EzyBrace® Systems.

FIXING TO TIMBER FRAMED FLOORS

BOWMAC® screw bolt to achieve a characteristic uplift strength of 12kN.

FIXING TO CONCRETE SLABS

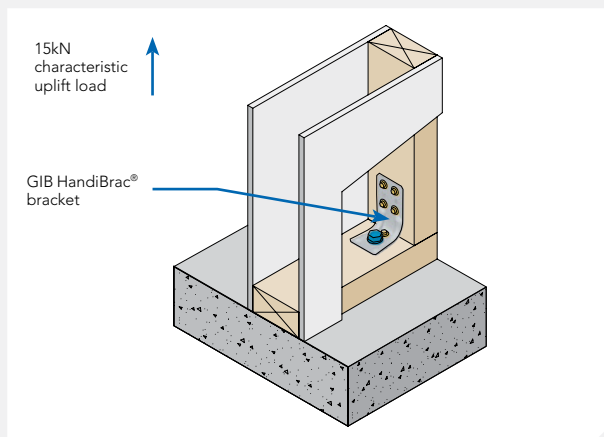
BOWMAC® screw bolt to achieve a characteristic uplift strength of 15kN



PANEL HOLD-DOWN DETAILS

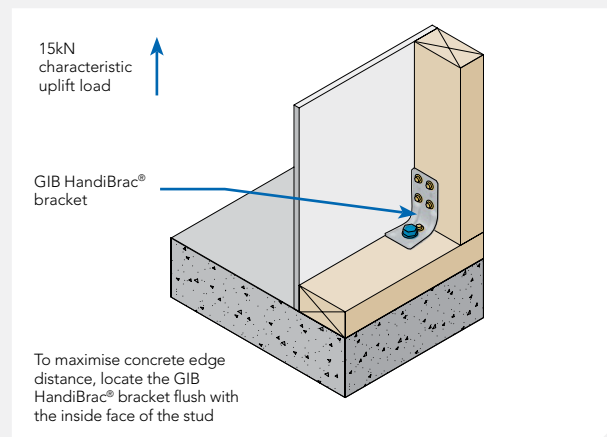
CONCRETE FLOOR – INTERNAL WALL

The bottom plate at both ends of the bracing element is fixed using a BOWMAC® screw bolt. For BOWMAC® screw bolt installation see instructions on next page



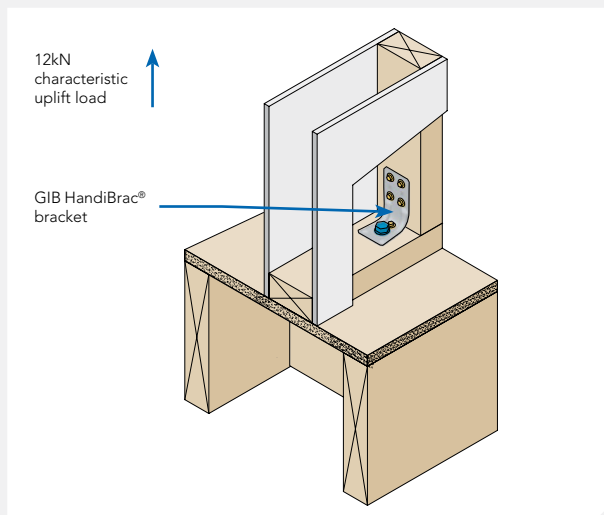
CONCRETE FLOOR – EXTERNAL WALL

The bottom plate at both ends of the bracing element is fixed using a BOWMAC® screw bolt. For BOWMAC® screw bolt installation see instructions on next page.



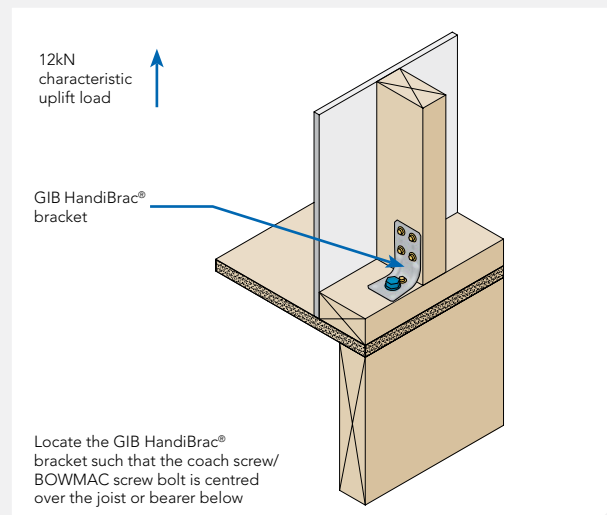
TIMBER FLOOR – INTERNAL WALL

Bottom Plate is fixed using a BOWMAC® screw bolt. For BOWMAC® screw bolt installation see instructions on next page.



TIMBER FLOOR – EXTERNAL WALL

Bottom Plate is fixed using a BOWMAC® screw bolt. For BOWMAC® screw bolt installation see instructions on next page.



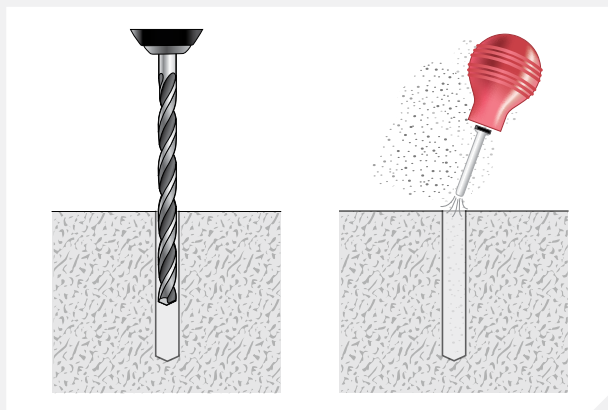


INSTALLATION OF GIB HANDIBRAC® BRACKET

1. Install the screw located in the bracket base
2. Install the BOWMAC® screw bolt as per instructions below
3. Install remaining four screws into the face of the timber stud

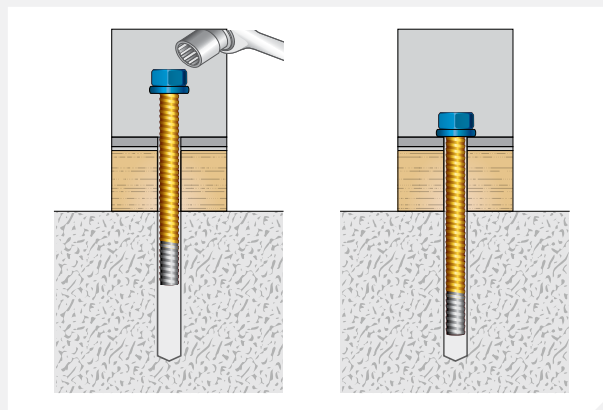
Installation Tips

- Use quality hexagonal socket with a ratchet spanner
- During installation debris or dust created by the thread cutting action may cause some resistance to be experienced. This is easily overcome by unscrewing the BOWMAC® screw bolt for one turn or more and then continuing to fix to the full embedment.



PREPARATION

- Use a 10mm diameter masonry bit for a solid concrete substrate and an 8mm diameter bit for fixing to a timber sub-floor.
- Drill a hole into the base material to depth 8 mm deeper than the required embedment and clean out the hole of dust and debris prior to installation of BOWMAC® screw bolt.



FIXING THE BRACKET

- Insert the bolt through the GIB HandiBrac® plate and bracket and into the hole.
- Begin tightening the bolt by applying forward pressure when engaging the first thread.
- Additional forward pressure may be required for installation in high strength, dense base materials.
- Continue tightening the anchor until the head is firmly seated against the GIB HandiBrac® base.
- In extremely dense material, use of an impact wrench is recommended.
- Be sure the bolt is at the required embedment depth.
- The installation is now complete.



GIB HANDIBRAC®

TRADEMARKS

The name GIB®, GIB HandiBrac® and the shield device are registered trademarks of Fletcher Building Holdings Limited.

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NZ Registered Design Application #420161

MANUFACTURER

GIB HandiBrac® is manufactured and distributed by MiTek New Zealand Ltd.

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Fax: 64-9-633 0101, Free Fax: 0800 229 222

Email: info@gib.co.nz

Web: www.gib.co.nz



Consent Issued BC160644

MESH SPECIFICATIONS



Specify and use with confidence.

Stock Code: **SE615-500STD**

Product Description: SE 615-500 XTRA-DUCTILE MESH (4.58M X 1.97M)

Yield Stress: ≥ 500 Mpa

Cross Section: $158\text{mm}^2/\text{m}$

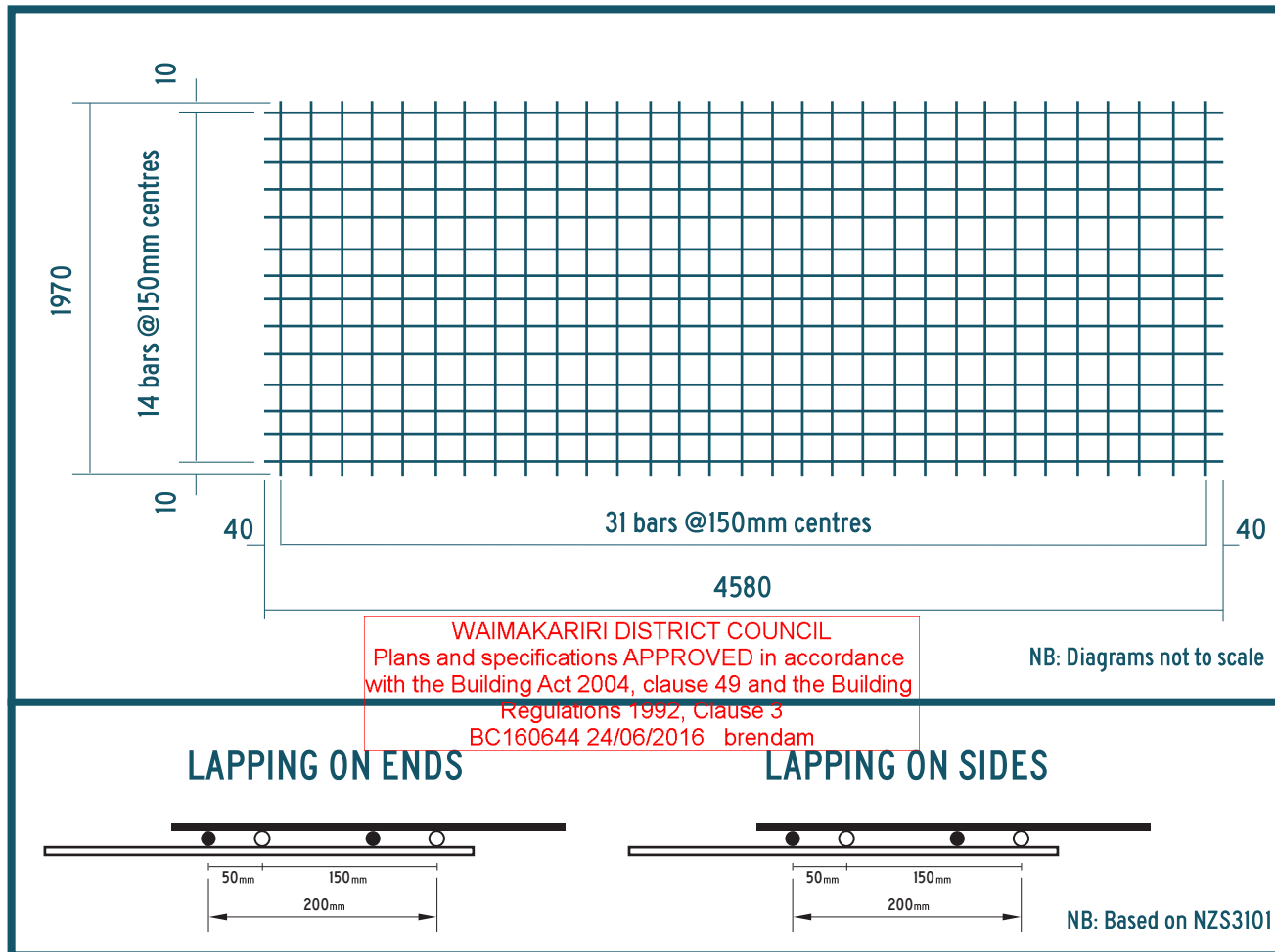
KN per metre width: **79 KN/m width**

Uniform Elongation: $\geq 10\%$

Weight per SQM: **2.490 kg/m²**

Nett Cover: **7.525m²**

	LONG WIRE	CROSS WIRE
WIRE DIA. (mm)	R5.5	R5.5
CENTRES (mm)	150	150
LENGTH (mm)	4580	1970
NO. OF WIRES	14	31
O/HANG (mm)	40	10
GROSS WEIGHT PER SHEET	23.38 kg	
WIRE kg/M	0.187	0.187
WEIGHT (kg)	11.97	11.40
GROSS SHEET AREA	9.02 m ²	



Each batch of Euro Steel Xtra-Ductile mesh is tested for compliance with AS/NZS4671:2001. Batch test certificates are available from Euro Corporation.

Each sheet of EuroSteel Xtra-Ductile mesh has an identification tag attached that details the product code and the unique batch number relevant to the sheet. This tag should be left on the sheet when it is placed.

Lap diagrams on all Euro Corporation specification sheets are based on NZS3101 Concrete Structures Standard.

Specifiers, designers, builders, steel placers and other trades, need to verify the correct lap splice required for each specific situation.



www.eurocorp.co.nz

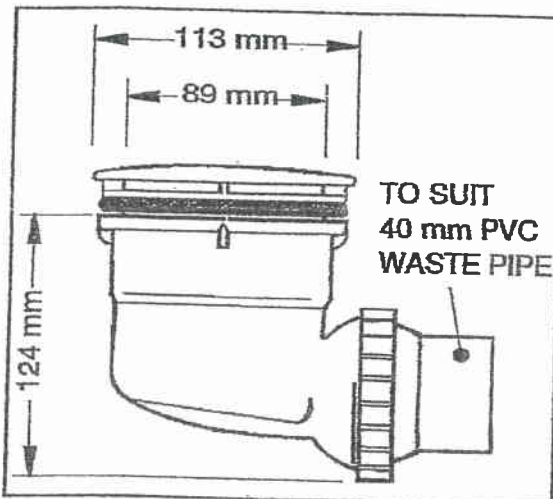
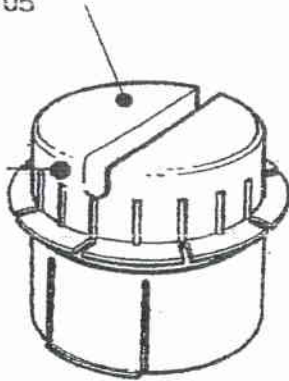
Fitting and Maintenance Instructions Easy Clean Trap

Consent Issued BC160644

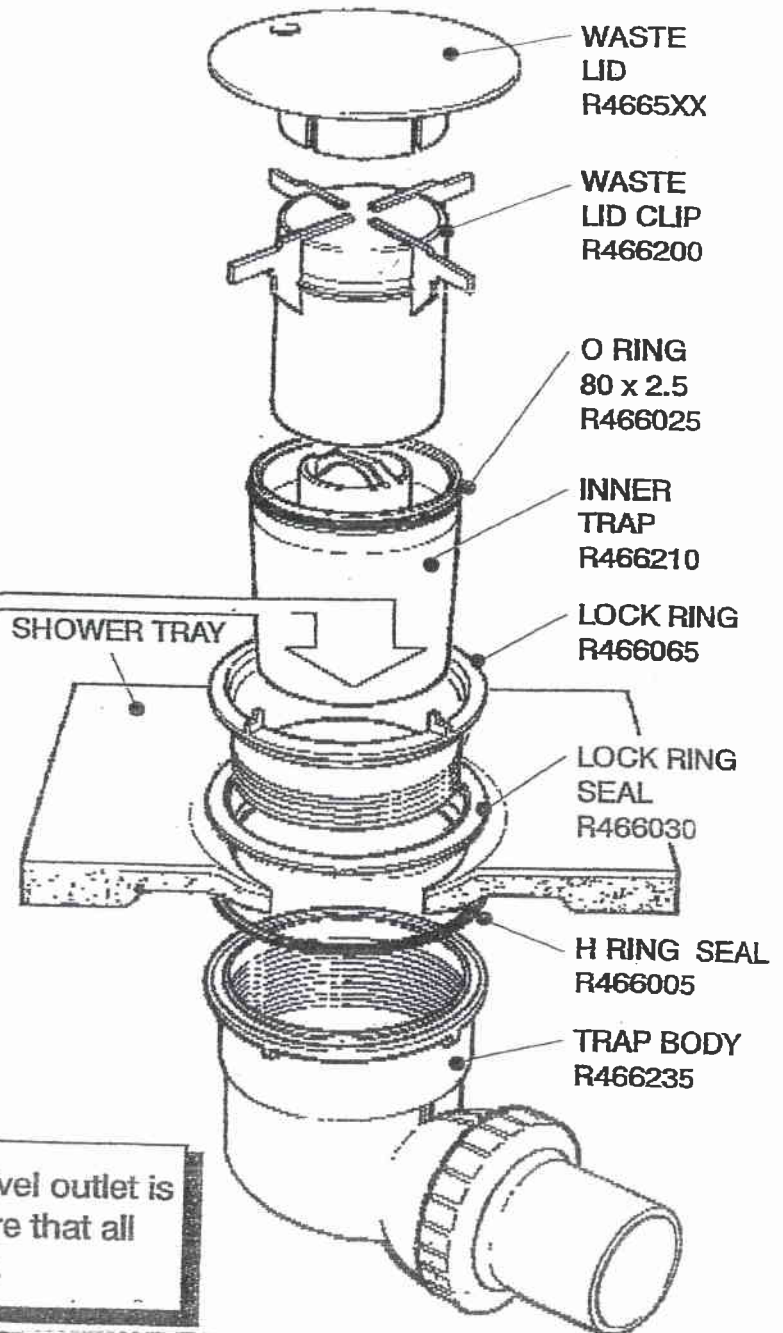
BC160644

WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
BC160644 24/06/2016 brendam

LOCK RING TOOL
R466105



NOTE: If during installation the swivel outlet is dismantled from the trap body, ensure that all parts are cleaned before reassembly.



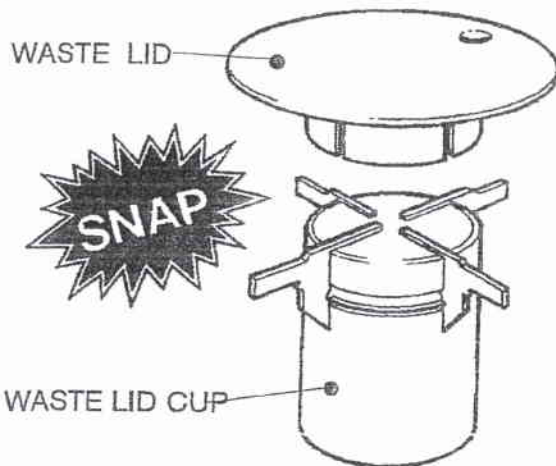
IMPORTANT

All installation must comply with Council and Local Authority By-laws.
It is the responsibility of the installer to ensure that the trap is made watertight.

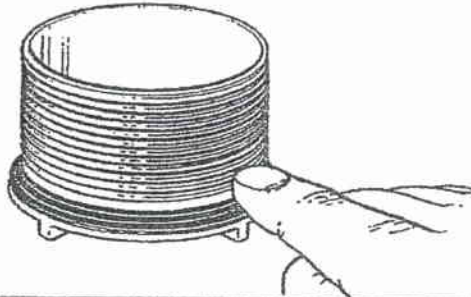
INSTALLATION

It is recommended that the **EASY CLEAN TRAP** is fitted to the shower tray prior to installation.

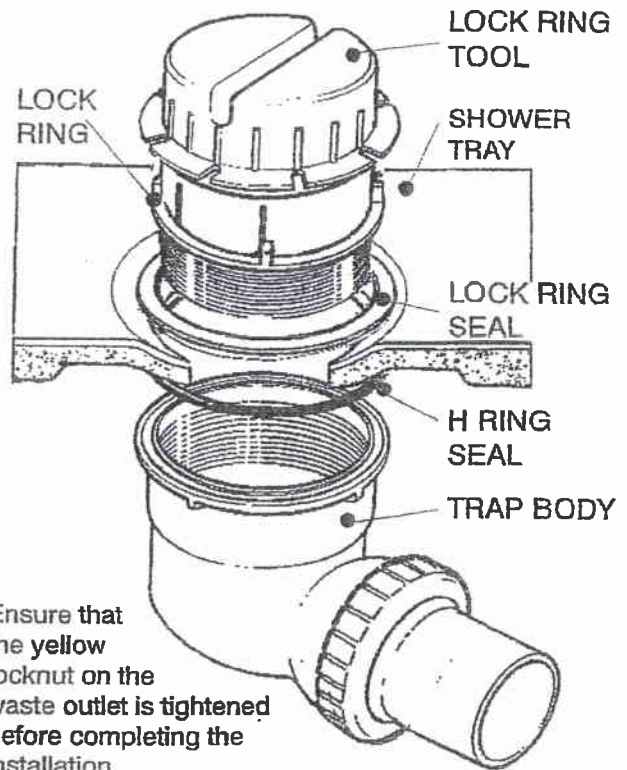
- 1** Align fingers on CUP with slots in WASTE LID. Then snap fit together.



- 2** Ensure lock ring seal is correctly fitted as shown above.

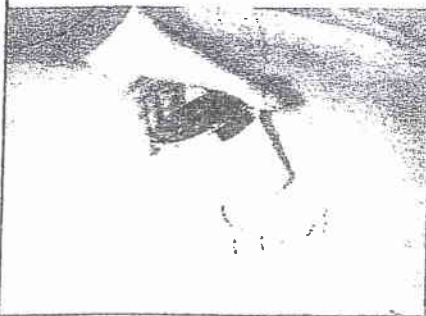


- 3** Fit EASY CLEAN TRAP to SHOWER TRAY. Use LOCK RING TOOL to tighten LOCK RING against 'O' RING and TRAP BODY. Remove LOCK RING TOOL before SNAP fitting WASTE LID assembly. (Refer step 3 below.)

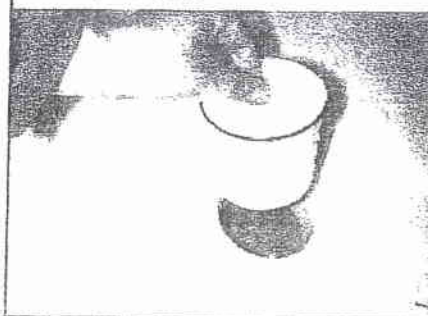


MAINTENANCE AND CLEANING

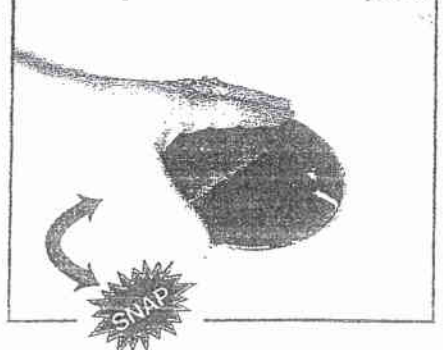
- 1** GENTLY prise WASTE LID assembly from LOCK RING in shower base.



- 2** Remove INNER TRAP. Remove any obstruction then wipe clean.



- 3** Replace INNER TRAP, then replace and rotate WASTE LID assembly until it SNAPS into place.



SALES & SERVICE: NEW ZEALAND KOHLER NZ LTD.

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AUSTRALIA KOHLER CO

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www.au.kohler.com

Design and specifications subject to change without notice.

WARNING: Products in this leaflet are subject to Industrial Property Protection. All dimensions given are approximate only.

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BRANZ Appraised

Appraisal No. 472 [2011]

SUPERFLEX™ WET AREA MEMBRANES

Appraisal No. 472 [2011]

Amended 27 March 2015



BRANZ Appraisals

Technical Assessments of
products for building and
construction.



Ardex New Zealand Limited

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BRANZ

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Private Bag 50 908
Porirua 5240,
New Zealand
Tel: 04 237 1170
branz.co.nz



Product

- 1.1 Superflex™ Wet Area Membranes are premixed and two-part, liquid applied waterproofing membranes for use under ceramic or stone finishes in internal wet areas.

Scope

- 2.1 Superflex™ Wet Area Membranes have been appraised for use as waterproofing membranes for internal wet areas of buildings, within the following scope:
- on floor substrates of concrete, flooring grade particleboard, plywood, and fibre cement sheet tile underlay, and on wall substrates of wet area fibre cement sheet lining systems and wet area plasterboard lining systems; and,
 - when protected from physical damage by ceramic or stone tile finishes; and,
 - where floors are designed and constructed such that deflections do not exceed 1/360th of the span.
- 2.2 The use of Superflex™ Wet Area Membranes on concrete slabs where hydrostatic or vapour pressure is present is outside the scope of this Appraisal.
- 2.3 Building structural movement and control joints in the substrate must be carried through to the tile finish. The design and construction of the substrate and movement and control joints are specific to each building, and therefore the responsibility of the building designer and building contractor and are outside the scope of this Appraisal.
- 2.4 Ceramic or stone tile finishes are outside the scope of this Appraisal.
- 2.5 The membranes must be installed by Ardex New Zealand Ltd trained and approved applicators.

Building Regulations

New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, Superflex™ Wet Area Membranes if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 (b) 15 years. Superflex™ Wet Area Membranes meet this requirement. See Paragraph 9.1.

Clause E3 INTERNAL MOISTURE: Performance E3.3.6. Interior wet area floors and walls incorporating Superflex™ Wet Area Membranes will meet this requirement. See Paragraphs 11.1 - 11.6.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Superflex™ Wet Area Membranes meet this requirement and will not present a health hazard to people.

- 3.2 This is an Appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance.

Technical Specification

- 4.1 Materials supplied by Ardex New Zealand Ltd are as follows:
- **Superflex™ WPM001 Premixed Bathroom and Balcony** - A one part, polymer-based, ready-to-use, liquid-applied membrane containing micro-fibres, supplied as a light blue thixotropic paste in 6.5 kg [approximately 5 litres] and 20 kg [approximately 15 litres] pails.
 - **Superflex™ WPM002 Two Part Bathroom and Balcony** - A fast drying, two part, flexible, cementitious-based, liquid applied membrane containing micro-fibres. It is supplied as Superflex™ WPM002 Part A Liquid in 10 and 20 kg pails and Superflex™ WPM002 Part B Powder in 10 kg multi-wall bags. When dry, the membrane is light grey in colour.
 - **WPM 155 Rapid** - A one part, water-based polyurethane-acrylic, ready-to-use, liquid applied, rapid setting membrane. It is supplied as blue/grey colour in 4 and 15 litre pails.
 - **Ardex STB Tape** - A uncured butyl tape with a fleece layer that is used in the ARDEX WPM 155 Rapid under tile waterproofing system.
 - **Superflex™ Primer** - A water-based primer used to seal substrates and enhance the adhesion of the membranes. It is supplied as a red coloured liquid in 20 kg plastic containers.

Handling and Storage

- 5.1 All materials must be stored inside, up off concrete floors, in dry conditions, out of direct sunlight and out of freezing conditions. The membrane products have a shelf life of 12 months from date of manufacture in the original unopened packaging. Once opened, the products must be used within 3 months.

Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Superflex™ Wet Area Membranes. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

- 7.1 Superflex™ Wet Area Membranes are for use in buildings where an impervious waterproof membrane is required to floors and walls to prevent damage to building elements and adjoining areas.
- 7.2 Superflex™ WPM002 Two Part and WPM 155 Rapid are designed to be used where a quicker curing time is required, such as in cool or humid conditions.
- 7.3 The membranes must be protected from physical damage by the application of ceramic or stone tile finishes.
- 7.4 Movement and control joints may be required depending on the shape and size of the building or room, and the tile finish specified. Design guidelines can be found in the BRANZ "Good Practice Guide Tiling".
- 7.5 Timber framing systems must comply with NZS 3604, or where specific engineering design is used, the framing shall be of at least equivalent stiffness to the framing provisions of NZS 3604, or comply with the serviceability criteria of AS/NZS 1170. In all cases framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and all sheet edges are fully supported. Timber framing systems supporting the substrates must be constructed such that deflections do not exceed 1/360th of the span. Where NZS 3604 is used, the allowable joist spans given in Table 7.1 shall be reduced by 20%.

Substrates

Plywood

- 8.1 Plywood must be a minimum of 17 mm thick complying with AS/NZS 2269, CD Grade Structural with sanded C face upwards and treated to H3 (CCA treated). LOSP treated plywood must not be used. The plywood must be supported with dwangs or framing with a maximum span of 400 mm in each direction, fixed with 10g x 50 mm stainless steel countersunk head screws at 150 mm centres on the edges and 200 mm through the body of the sheets.

Fibre Cement Compressed Sheet/Fibre Cement Sheet Tile Underlay

- 8.2 Fibre cement compressed sheet must be manufactured to comply with the requirements of AS 2908.2 and must be specified by the manufacturer as being suitable for use as a wet area substrate. Fibre cement sheet tile underlay must be covered by a valid BRANZ Appraisal for use in internal wet areas. Installation must be in accordance with manufacturer's instructions.

Particleboard

- 8.3 Particleboard must be specified for the end use in accordance with NZS 3602.

Concrete and Concrete Masonry

- 8.4 Concrete and concrete masonry substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101 and NZS 3604 Concrete Slab-On-Ground Floors and Concrete masonry to NZS 4229 and NZS 4230.

Wet Area Wall Linings

- 8.5 Plasterboard wall linings must be manufactured to comply with AS/NZS 2588, and be covered by a valid BRANZ Appraisal for use in internal wet areas.
- 8.6 Fibre Cement Sheet must be covered by a valid BRANZ Appraisal for use in wet areas.

Durability

Serviceable Life

- 9.1 Superflex™ Wet Area Membranes, when subjected to normal conditions of environment and use, are expected to have a serviceable life of at least 15 years and be compatible with ceramic or stone tile finishes with a design service life of 15-25 years.

Maintenance

- 10.1 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.
- 10.2 In the event of damage to the membranes, the tiling must be removed and the membrane repaired by removing the damaged portion and applying as for new work.
- 10.2 Drainage outlets must be maintained to operate effectively, and ceramic or stone tile finishes must be kept clean.

Internal Moisture

- 11.1 Superflex™ Wet Area Membranes are impervious to water and when appropriately designed and installed will avoid the likelihood of water penetrating behind linings or entering concealed spaces.
- 11.2 Superflex™ Wet Area Membranes are suitable for use to contain accidental overflow to meet NZBC Clause E3.3.2. A means of Code Compliance for overflow is given in NZBC Acceptable Solution E3/AS1, Paragraph 2.
- 11.3 Surfaces must be finished with ceramic or stone tile finishes. A means of Code Compliance to NZBC Clause E3.3.3 and E3.3.4 is given in NZBC Acceptable Solution E3/AS1 Paragraph 3.1.1 (b), 3.1.2 (b) and 3.3.1 (b).

- 11.4 Falls in showers and shower areas must be a minimum of 1 in 50. In unenclosed showers, falls must extend a minimum of 1500 mm out from the shower rose. Floor wastes must be provided and the floor must fall to the outlet.
- 11.5 The waterproofing membrane must completely cover shower bases, and for unenclosed showers it must extend a minimum of 1500 mm out from the shower rose. Further design guidance on waterproofing wet areas, including waterproofing walls and junctions can be obtained from AS 3740, BRANZ "Good Practice Guide Tiling", and flooring and wallboard manufacturers.
- 11.6 Where water resistant wall finishes such as prefinished sheet materials are used, they must flash over the membrane a minimum of 30 mm.

Installation Information

Installation Skill Level Requirement

- 12.1 Installation of the membranes must be completed by Ardex New Zealand Ltd trained and approved applicators.
- 12.2 Installation of substrates must be completed by tradespersons with an understanding of internal wet area construction, in accordance with instructions given within the Ardex New Zealand Ltd Technical Literature and this Appraisal.

Preparation of Substrates

- 13.1 Substrates must be dry, clean and stable before installation commences. With surfaces that are even and free from nibs, sharp edges, dust, dirt or other materials such as oil, grease or concrete formwork release agents.
- 13.2 The relative humidity of the concrete must be 75% or less before membrane application. Concrete substrates can be checked for dryness by using a hygrometer as set out in BRANZ Bulletin No. 424.
- 13.2 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 fiberglass mesh installed as set out in the Technical Literature.

Membrane Installation

- 14.1 Installation must not be undertaken where the substrate surface temperature is below 10°C or above 35°C.
- 14.2 Superflex™ WPM002 Two Part Bathroom and Balcony liquid and dry components must be mixed and left to stand for 5 minutes before re-mixing, then applying. Superflex™ WPM001 Premixed Bathroom and Balcony and WPM 155 Rapid must be thoroughly stirred before application.
- 14.3 The membranes must be applied in a minimum of two coats at the rates set out in the Technical Literature to give a total finished thickness of 1.0 - 1.5 mm. Subsequent coats must be applied at an opposite direction to the previous coat.
- 14.4 Application can be made by roller (medium/long nap), brush (long bristle), or a flat steel trowel.
- 14.5 Reinforcement fabric is bedded into the wet layer between coats to provide movement protection at wall/wall and wall/floor junctions, and at any other areas such as joints in the flooring substrate, floor cracks or around penetrations in the membrane. ARDEX STB Tape must be used with WPM 155 to take advantage of the rapid/fast drying features.
- 14.6 Clean up may be undertaken with water.

Tiling

- 15.1 The membranes must be fully cured before tiling. The cured membranes must be protected at all times to prevent mechanical damage, so may require temporary covers until the finishing is completed.
- 15.2 Tiling must be undertaken in accordance with AS 3958.1 and the BRANZ "Good Practice Guide, Tiling". The compatibility of tile adhesive must be confirmed with the adhesive manufacturer or Ardex New Zealand Ltd.

Inspections

16.1 Critical areas of inspection are:

- Construction of substrates, including crack control and installation of bond breakers and movement control joints.
- Moisture content of the substrate prior to the application of the membrane.
- Acceptance of the substrate by the membrane installer prior to application of the membrane.
- Installation of the membrane to the manufacturer's instructions, particularly installation to the correct thickness and use of reinforcement.
- Membrane curing and integrity prior to the installation of tiles including protection from mechanical damage during curing and prior to tile installation.

Health and Safety

- 17.1 Safe use and handling procedures for the membranes are provided in the Technical Literature. The materials must be used in conjunction with the relevant Material Safety Data Sheet.

Basis of Appraisal

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

Tests

- 18.1 The following testing of Superflex™ WPM001 Premixed Bathroom and Balcony and Superflex™ Two Part Bathroom and Balcony has been undertaken by Ardex Australia Pty Ltd research and development laboratory: water vapour transmission; water absorption; tensile strength and elongation before and after UV exposure, immersion in bleach, immersion in industrial detergent and immersion in water. Test methods and results were reviewed by BRANZ and found to be satisfactory.
- 18.2 The following testing of Superflex™ WPM001 Premixed Bathroom and Balcony was undertaken by the Commonwealth Scientific Industrial Research Organisation (CSIRO) Australia:
- In accordance with ANSI A118.10 for ICBO Evaluation Service - dimensional stability; waterproofness; shear strength to ceramic tile and cement mortar; and fungal and micro-organism resistance.
 - In accordance with AS 1145 - behaviour under cyclic strain.
- 18.3 Testing of Superflex™ WPM001 Premixed Bathroom and Balcony and Superflex™ WPM002 Two Part Bathroom and Balcony has been undertaken by BRANZ for low temperature flexibility and peel adhesion after heat/humidity aging.
- 18.4 The following testing of WPM 155 Rapid was undertaken by various organisations:
- Durability testing to AS/NZS 4858 Appendix A including effect of heat aging, bleach, detergent and water on tensile strength and elongation.
 - Cyclic movement resistance requirements of AS/NZS 4858:2004 Appendix B.
 - Water Vapour Transmission using both wet and dry cup methods from ASTM E96.
 - Water transmission behaviour following the procedures of AS/NZS 4858 Appendix C.
- The above test methods and results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

- 19.1 An assessment was made of the durability of the Superflex™ Wet Area Membranes by BRANZ technical experts.
- 19.2 Site visits have been carried out by BRANZ to assess the practicability of installation and to examine completed installations.
- 19.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

- 20.1 The manufacture of the membrane has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.
- 20.2 The quality management system of membrane's manufacturer has been assessed and found to be satisfactory.
- 20.3 The quality of supply of the membrane system materials to the market is the responsibility of Ardex New Zealand Ltd.
- 20.4 Quality on site is the responsibility of the Ardex New Zealand Ltd approved and trained applicators.
- 20.5 Designers are responsible for the substrate design, and building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of the substrate manufacturer, Ardex New Zealand Ltd and this Appraisal.
- 20.6 Building owners are responsible for the maintenance of the tiling or stone finishing systems in accordance with the instructions of Ardex New Zealand Ltd.

Sources of Information

- AS 2908.2: 2000 Cellulose-cement products - flat sheet.
- AS 3740 - 2010 Waterproofing of wet areas within residential buildings.
- AS 3958.1: 1991 Guide to the installation of ceramic tiles.
- AS/NZS 1170: 2002 Structural design actions.
- AS/NZS 2269: 2008 Plywood - Structural.
- AS/NZS 4858 - 2004 Wet area membranes.
- NZS 3101: 2006 The design of concrete structures.
- NZS 3602: 2003 Timber and wood-based products for use in buildings.
- NZS 3604: 2011 Timber-framed buildings.
- NZS 4229: 1999 Concrete masonry buildings not requiring specific engineering design.
- NZS 4230: 1990 Code of practice for the design of masonry structures.
- Acceptable Solutions and Verification Methods for New Zealand Building Code External Moisture Clause E2, Ministry of Business, Innovation and Employment, Third Edition July 2005 [Amendment 6, 14 February 2014].
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents.
- The Building Regulations 1992.
- Good Practice Guide Tiling, BRANZ, March 2004.
- Good Practice Guide Membrane Roofing, BRANZ, October 2003.

Amendments

Amendment No. 1, dated 31 January 2012.

This Appraisal has been amended to update clause changes as required by the introduction of NZS 3604: 2011 and NZBC Acceptable Solution E2/AS1 Third Edition, Amendment 5.

Amendment No. 2, dated 27 March 2015.

This Appraisal has been amended to add WPM 155 Rapid.



BRANZ Appraisal
Appraisal No. 472 [2011]
15 April 2011

SUPERFLEX™ WET AREA
MEMBRANES



In the opinion of BRANZ, **Superflex™ Wet Area Membranes** are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Ardex New Zealand Limited**, and is valid until further notice, subject to the Conditions of Appraisal.

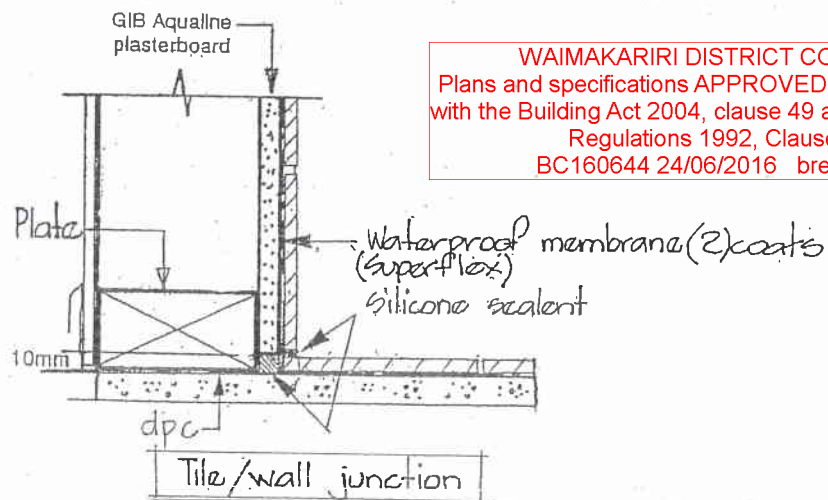
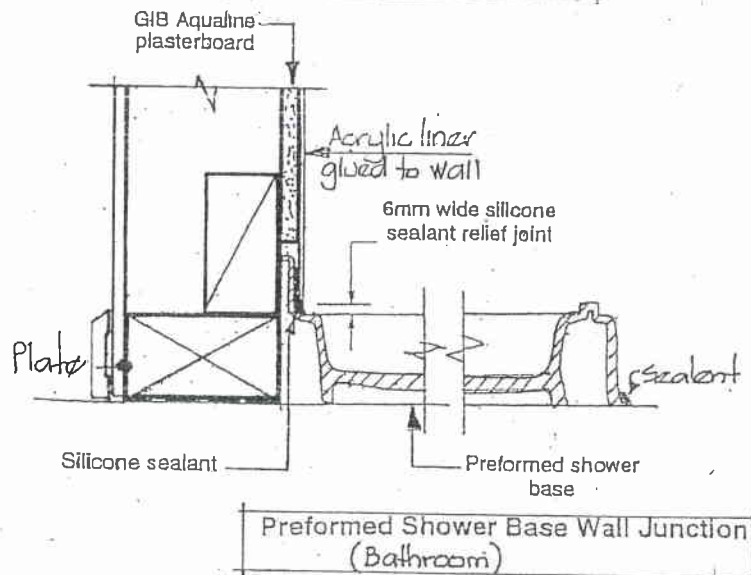
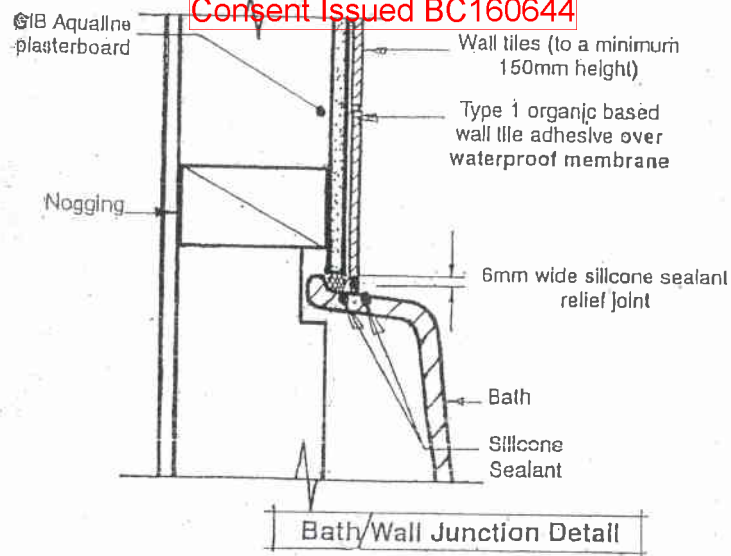
Conditions of Appraisal

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. **Ardex New Zealand 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 **Ardex New Zealand 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 **Ardex New Zealand Limited** or any third party.

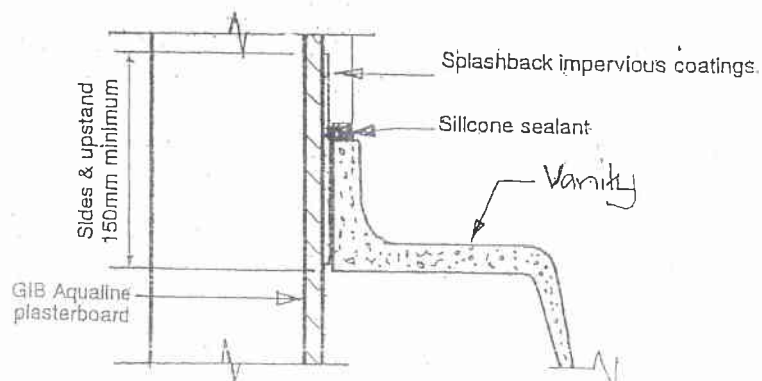
For BRANZ

A handwritten signature in blue ink, appearing to read 'Pieter Burghout'.

Pieter Burghout
Chief Executive
Date of Issue:
15 April 2011



WAIMAKARIRI DISTRICT COUNCIL
Plans and specifications APPROVED in accordance
with the Building Act 2004, clause 49 and the Building
Regulations 1992, Clause 3
BC160644 24/06/2016 brendan



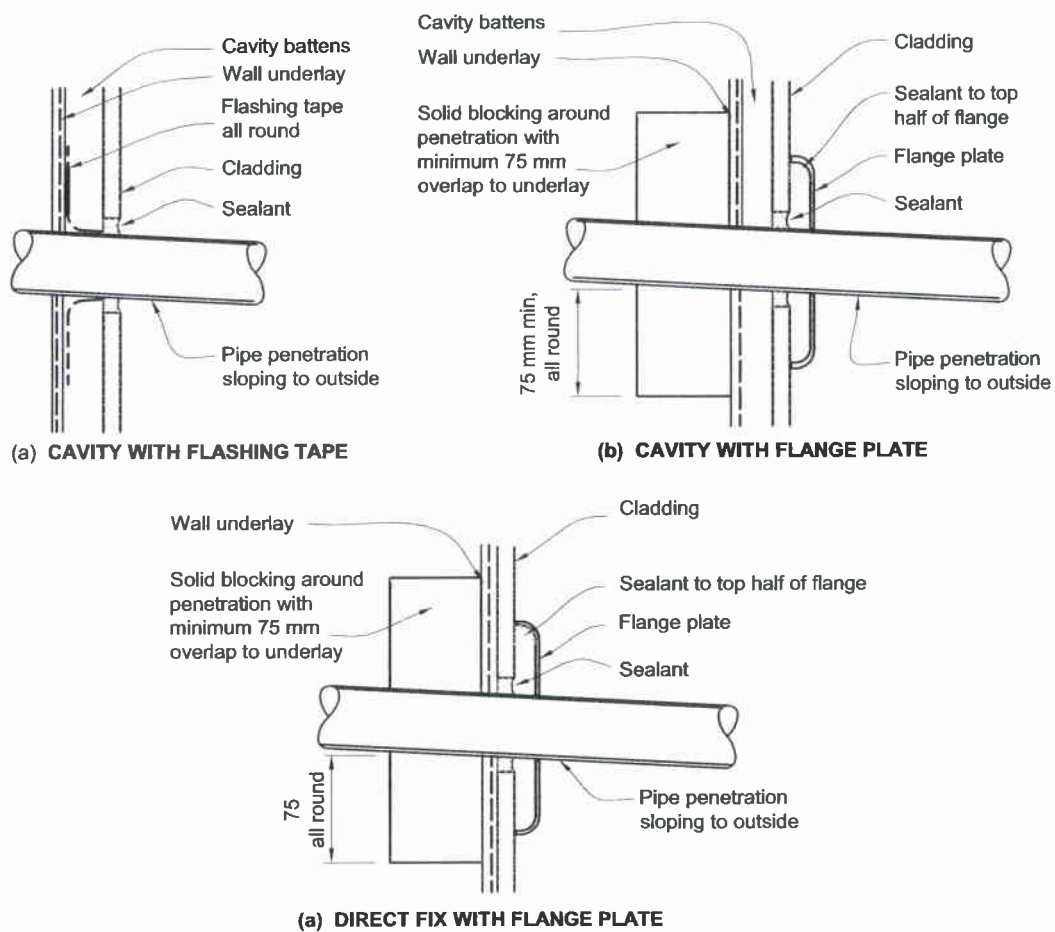
EXTERNAL MOISTURE

Acceptable Solution E2/AS1

Log in or register to view
seller's phone numbers

Figure 68: General pipe penetration
Paragraph 9.1.9.3, Figure 126

Expires: Wed 16 Mar, 8:11 pm



Amend 5
Aug 2011

Amend 5
Aug 2011

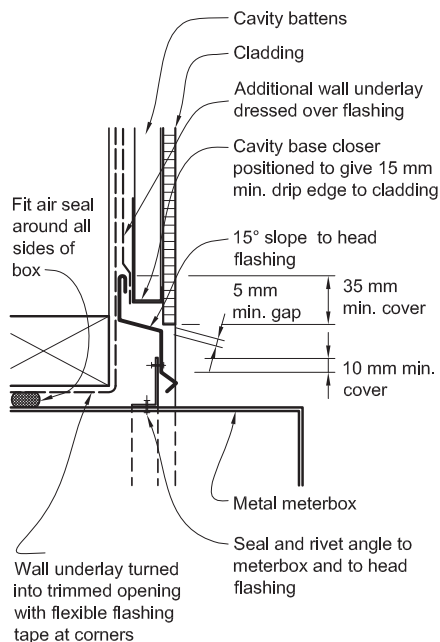
COMMENT:

Where possible, pipe penetrations, meterboxes and similar penetrations should be located in sheltered areas of the building, such as a porch, or be installed behind a weatherproof glazed panel.

Amend 5
Aug 2011

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Figure 69: General meterbox and similar penetrations
Paragraphs 9.1.9.3, 9.6.8.5 and 9.6.9.6



NOTE:

- (1) Fix angle and seal to all sides of box.
At sides and base, *claddings* shall overlap angle by 10 mm minimum. Continuously seal *cladding* against angle.
- (2) Suitable for other similar penetrations.

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Aug 2011

9.1.9.4 Inter-storey junctions

Inter-storey junctions in *claddings* over *drained cavities* shall be formed for *walls*:

Amend 5
Aug 2011

- a) Up to a maximum of two storeys or 7 metres in height, as shown for the specific *wall claddings* in Paragraph 9.2 to Paragraph 9.9, or

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Aug 2011

- b) Over two storeys or 7 metres by using an inter-storey *flashing* bridging the *drained cavity* as shown in Figure 70.

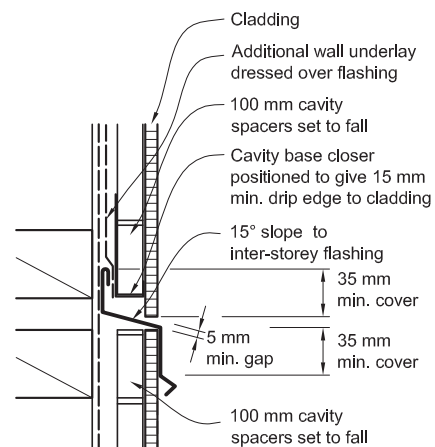
COMMENT:

A *drained cavity* height is limited to manage the moisture handled by the cavity before it is directed to the outside.

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Figure 70: General inter-storey junction
Paragraphs 4.6.1.7, 9.1.9.4,
Figure 16



NOTE: To be used to limit continuous cavities to the lesser of 2 storeys or 7 metres.

Amend 5
Aug 2011

9.1.10 Windows and doors

Windows and doors shall comply with the requirements of NZS 4211, and reveals shall comply with NZS 3602. *Flashings* shall comply with Paragraph 4.0. Window details specific to particular *claddings* are given in Paragraph 9.2 to Paragraph 9.9. Door details shall be based on window details and shown in Figures 17A–D.

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Aug 2011

After installation, the flange forming the window or door facing shall have an overlap to the surrounding *cladding* material or associated back *flashings* of

- a) For jambs – 10 mm minimum
- b) For sills – 8 mm minimum.

Amend 5
Aug 2011

9.1.10.1 Scope

This Acceptable Solution is limited to aluminium window and door joinery that:

- a) Has horizontal window and door heads only
- b) Has maximum frame dimensions of 5000 mm wide or 5000 mm high, and a maximum overall frame area, for any one frame, of 13.5 m², or
- c) For sills to floor level, has maximum width of 6 m and maximum overall frame area is 16 m².

Amend 5
Aug 2011

Amend 2
Jul 2005